PROCEEDINGS
OF THE 1982 ANNUAL MEETING OF
THE CANADIAN AGRICULTURAL ECONOMICS SOCIETY

University of British Columbia, Vancouver
July 12-14, 1982

Edited by
E. W. Tyrchniewicz

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URBAN INFLUENCE ON AGRICULTURE AND FOOD: ECONOMIC EFFECTS*

Chairman: E.W. Tyrchniewicz**

THE POLICYMAKING PROCESS IN AN URBANIZED AGRICULTURE

E.A. Poyser***

To begin with, it is perhaps wise to talk about the perspective on agricultural policy making from which I developed subjective judgments. Basically this involved a civil servant's perspective in 10 years or so of agricultural research functions, 15 years of federal-provincial interaction on agriculture and related policies from a provincial perspective, and seven years of federal-provincial economic development and agricultural policy from a federal perspective. This experience, placed in time, includes research activities during the fifties, rural development policies and practices of the sixties, and regional development policies of the seventies.

In considering the topic of agricultural policy in an urban setting, one is confronted with the complexity of forces acting on policy. You are tempted to gather together data to confirm the consumer orientation and considerations necessary in the development of policy. Probably it is sufficient to note that about 93 percent of Canadians are served by policies sensitive to the consumption side--all Canadians as consumers and a great number of people involved with interlinked goods and services sectors carrying out processing, wholesaling, transporting and distributing of agricultural products and the provision of a wide range of other farm and home servicing. Only about 7 percent of Canadians are involved as farmers in primary production functions. They express their individual and group interest through a range of formal and informal farm, community and commodity organizations. However, it should be noted many farmers and farm interest groups are involved directly or through their organizations in many parts of the processing, marketing, distribution and retailing policies and decisions. This involvement is laudatory as it provides farmers with current knowledge, a window if you will, on the values and attitudes of people in the marketplace.

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*George Brinkman's Presidential address, THE ROLE OF AGRICULTURAL ECONOMISTS IN AN URBANIZED AGRICULTURE, was presented in this session. It was published in the March 1983 issue of the Canadian Journal of Agricultural Economics.

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These private sector producer and consumer interests are represented in the public arena by 11 senior governments, two territorial councils and a great number of urban and municipal councils, each having its respective levels of legislative, planning, and resource allocation powers. Over the years, in response to pressures by a variety of private interest groups, Canada has developed a complex set of federal, provincial, and community social and economic legislation directly aimed or indirectly at setting the framework for agricultural decision making. On the public side the dominant influences have been the federal and provincial governments who share power to legislate on agricultural matters. This sharing of power has resulted in many stormy periods on precedence in agricultural legislative power which all of you will be aware of in some form or another.

The federal-provincial relations debate brings to mind the story about a group of reporters sent out to do a story on elephants when the circus came to town. When the Editor asked them for their stories the next morning the Frenchman turned in a story on the love life of the elephants, the Texan turned in his story on bigger and better elephants in his homestate, the English reporter had lost his notes, and the Canadian was still trying to sort out whether elephants came under federal or provincial jurisdiction.

One could dwell on the complexities affecting agricultural policy in an urban setting, but, in summary, private sector interests in agricultural policy are dominated by consumers who are becoming more aware of the consumer impacts of farm oriented policy. Social and economic legislation of governments in the future will have to be much more sensitive to consumer interests in the development of policies affecting agriculture and food production.

The subject of the policy making process is a large and stimulating avenue for discussion. In my time I would like to talk about two conceptual approaches which I have found useful in trying to rationalize issues affecting policy making process:

1. Agricultural Policy Process and Framework Policy Considerations, and
2. The Policy Process and National, Regional and Local Goals and Objectives.

Turning to the social and economic policy options associated with the agricultural industry, it is useful to consider the effect of other public policy areas on the agricultural sector. There is a whole network of public policies, sometimes called framework policies, which have been developed to serve broad national or provincial interests and all have major consequences for the structure of agriculture. It is no revelation that monetary policy and the cost of money is having a profound effect on the dynamics of the agricultural industry. Trade and foreign relations arrangements have an immense effect on agriculture. For example, grain

sales to communist countries and the destabilizing effects of grain embargoes during periods of international tension have had immense long term effects on Canadian agricultural industry. And I expect Dr. Gilson could entertain us for some time about the importance attached to transportation policy and Crow rates in determining the structure of commercial agriculture on the prairies. Industrial development and labour policies concerning matters such as processing plant location and labour rates or offshore migrant labour have large consequences for regional opportunities in the agricultural sector. Land use policies practised by provinces and municipalities are central to the opportunities to continue production of several fruit and vegetable crops in better climatic areas of Canada. Community development activities utilizing the agricultural sector are important to meet the needs of people in frontier and remote areas of Canada where with perseverance and diligence considerable domestic food needs can be grown locally. Family well-being and individual nutrition available from locally produced foods are important particularly to people living in remote areas where fresh food availability and diet variety can be limited.

Right now we have a classic case of framework policy and its impact on agricultural sector performance and perhaps reaching some climax of policy reform for prairie region agriculture. It appears clear that agricultural sector performance has been constrained by transportation and other policy. While policies concerned with farm production continue to be important, current priorities to improve performance of the agricultural sector and initiatives to expand export capacity are dependent on initiatives "outside the farm fence."

In the transportation area of policy, these include rail line capacities, port capacities, and the Crow rate. In trade policy, the question is "If we don't take Japanese cars, will they restrict our oilseed markets?" In finance policy, we observe a billion dollar credit advance to finance grain sales to Russia.

Canadians appear to be in agreement on a general goal or mission for agricultural policy which may be summarized as the expansion of food production on a sustainable basis. But the policies necessary to pursue world, domestic, or frontier needs differ widely. Three phases of agricultural policy need attention concurrently. A diagrammatic display of these three phases of agricultural policy together with examples of importance of framework policies is presented in conceptual form in Figure 1. The world oriented phase of agricultural policy illustrated in Figure 1 requires a priority on trade, tariff, transportation policies and on agricultural efficiency capable of meeting fierce world competition. In contrast, a second phase, or the domestic-oriented part of agricultural policy, requires consideration of food sufficiency targets, processing, wholesaling and retailing margins and often a concern for income and equity objectives for farm families. A third phase of agricultural policy, aimed at community development and well-being objectives, has been practised at one time or another by all communities in Canada. This phase of policy is focused on people's sense of well being and quality of life and requires agricultural policy aimed at achieving greater levels of self-sufficiency in perishable foods and utilizing available local food sources.

Policy Phases	Ag. Policy Objectives	Monetary Policy	Trade and Foreign Relations	Trans-portation	Industrial Development and Labour	Land Use	Community Development	Family & Individual
World and N National	Efficiency	X X	X X X	X X X	X	X	X	X
Domestic and Regional	Equity	X	X	X X	X X X	X X X	X	X
Frontier and Community	Self-Sufficiency			X	X X	X X	X X X	X X X

Figure 1

Agricultural Policy Framework

In practice, all three phases of agricultural policy with their different objectives are carried forward concurrently. It is not common, however, to find agriculturists who accept that agricultural policy in Canada has three broadly differing objectives requiring separate policy and program considerations.

For instance, for western Canada, an export market for several billion dollars worth of grain and oilseeds must be found and maintained at competitive pricing or the agricultural sector and western provinces will experience severe economic dislocation and depression. Progress can be made in increasing value-added to commodities and in the processing of primary products prior to domestic or export disappearance if markets can be found for the processed products. But, without dollars coming in from world trade, the balance of payments and farm and related industry income would be severely eroded.

The second phase of agricultural policy, centered on domestic sufficiency of food and regional development, is the most complex policy phase due to its multiple objectives. Food sufficiency objectives require a structure of rules and regulations to induce or control producers to meet target levels. When income support or equity objectives are introduced as program objectives there is a substantial distortion of food sufficiency objectives. Where regional development objectives call for measures to stimulate local processing and job development, a further complication of policy objectives and resource allocation is introduced.

A third phase of agricultural policy, aimed at meeting food needs of frontier and remote communities by use of local community resources, is basically a social policy involving agricultural resources. It has little direct involvement with either international, national or regional policy in agriculture. I have found the concept of agro-euthenics evolved by Alaska agriculturists useful. Literally translated according to the Random House dictionary--agro refers to soil and crop production, and euthenics is a science concerned with bettering the condition of human beings through improvement of their environment. Applied to frontier communities this can involve the culturing, gathering, preserving and storing of available cultivated and naturally occurring foods by people increasingly involved in the modern ecosystem. Within this concept agriculturists should program for the central needs of the people which include the development of home gardens, the production of cultivated crops where feasible, culturing of elk, moose, reindeer, and the gathering and preserving of locally available flora and fauna without being constricted by criteria of efficiency necessary to export or of market share and quota systems involved in food sufficiency.

These three phases of agricultural policy are promoted in various forms in all regions of Canada, by federal and provincial governments. The BNA Act which granted joint jurisdiction in agriculture has been remarkably flexible and allowed for an evolution of roles of provincial and federal agencies. Some interesting observations can be made on the outcome of this evolution.

Western provinces, for instance, have found it important on behalf of the producers to develop and maintain an active and aggressive policy towards improving export levels for prairie produced agricultural commodities. Over the last decade or two substantial commitments of the time and resources of Premiers, Ministers and officials have gone into trying to expand export market opportunity even though the BNA Act and the constitution allocates a priori power to the federal government in these matters.

Central provinces and B.C. have, in my view, concerned themselves to a far greater degree with management of the agricultural sector to obtain greater self-sufficiency in food and to obtain levels of income parity and equity with workers within their provinces--a role provided for by the division of powers for agriculture under the constitution but which limits national objectives for pursuing comparative advantage in agricultural production in Canada.

Regions such as the Yukon, the Northwest Territories and Newfoundland and northern parts of central and western provinces are pursuing greater levels of community and area self-sufficiency in food which respond to the concerns of people in these regions of Canada. Regrettably, in my view, many agriculturists have been far too quick to respond to these expressed needs of people in terms of export-oriented agricultural and food sufficiency by development of grain farms and ranches or allocating quotas and licences rather than by developing agricultural and food activities that respond to the social needs expressed by the residents.

Turning briefly to the topic of communications and policy making process, I submit that, given modern electronics and communication, we have all become part of an urban society and in fact a world society. Modern communications inventions and possibilities have resulted in increased information on the impacts of agricultural policy on the levels of well-being of the consumers. Over time a greater level of consumer sovereignty over the marketplace will develop with increased utilization of available communications technology. The forms that this will take are hard to predict but all it might take is someone to become the Ralph Nader of the food industry.

Tofler in a recent book talked about the "prosumer." Briefly, prosumers are people in a position to be selective about the information they want and to access information on matters central to their goals and needs. Modern electronics will make possible the emergence of a prosumer population. Consumers on the other hand develop consumption patterns in response to awareness and advertising efforts of literally thousands of product promoters. Young people in schools and colleges are now becoming comfortable with and dependent on electronic hardware and software. As they come into the labour force they will demand that information on products be available through electronic systems, be it cars and dishwashers or soap varieties and nutritional foods.

Just to highlight then a few observations on the policy making process:

1. Emphasis is needed on improving our understanding of framework policies and our capacity to interrelate farm-firm analysis with framework policy decisions.

2. Three distinct goals for agricultural policy and three distinctly different approaches to program development and implementation have to be accommodated in the agricultural policy process.

3. Communications technology has made agricultural policy transparent to world and urban interests. The recent incident of Mother Theresa's asking, "Why do we dump surplus milk?" and the answer, "we've always done it when we have a surplus," served to sharply illustrate the communications impact.

4. The challenge to agrologists is to assess the development of clear conceptual settings and program content which minimize negative impact and conflict in the pursuit of three separate policy goals.

"Quo Vadis" as the Romans say. "Where are we going?" There are 10 provinces and two territories each in varying stages of creating regional or area agricultural related strategies and framework policies suitable to their needs. The federal government, in assuming national agricultural strategy leadership, finds that it is faced with demands to tailor and adjust programs within its mandate to reflect regional differences. But federal officials are faced with some difficult policy decisions. For example, from a macro-economic policy viewpoint a major national priority is placed on the development of policies to expand export of agricultural and other resource commodities for balance of payments reasons and as a generator of economic activity. This policy stance requires an open approach to competition in agriculture and willingness to accept imports from other countries. Paradoxically, import replacement policies and barriers to trade with other countries are also pursued under national policy in the interests of food sufficiency and jobs and income security.

I submit that some greater understanding of national, regional and local objectives--the conceptualization of a three-phase approach to agricultural policy among policy planners and advisers, could be helpful to those involved in rationalizing the policy making process. Moreover, there will be a growing need to restructure programs to minimize conflict between the three distinct phases of agricultural policy. One thing for certain is that agricultural policy advisers will have to become thoroughly conversant with other framework policy objectives and programs if agricultural policy decision makers are to be sensitive to the broader decision arenas of public policy. Until there is a better understanding of where we are being led in the agricultural industry, confusion in the policy making process will persist. In short, "Quo Vadis."

THE INFLUENCE OF AGRICULTURE--TOO LITTLE OR TOO MUCH!

Murray H. Hawkins and Jim MacArthur*

From Adam Smith to John Kenneth Galbraith, the doctrine of pluralism has led successive groups of economists of liberal persuasion to view the existence of power in the marketplace with cynicism and distrust. The economic world of the economist has been tied up within a universe of numbers, information mobility and numerous, rational, utility maximizing consumers. It is our direct conjecture that the "tools and jewels" of the social catechism, so carefully taught and preserved within the temples of economic learning, do very little to equip us in developing the conceptual framework needed to analyse power relationships and their impact on activities within agriculture and rural Canada.

People and institutions are all involved in weaving concentrated, horizontal and vertical arrangements. They are engaged in these pursuits, in order to develop a quiet, orderly environment from which to pursue their own self interests. Operational efficiency and power make an effective team in making a smooth path towards survival and pure profits. It is against this background that both Smith and Galbraith attempted to arrive at solutions as to the disposition of power in economic theory. For the former economist-philosopher, there never was a problem with power. For the latter gentleman, he has had to learn how to cope with power in the newly derived industrial organization, through controls and a strong government presence.

From this mixture of economics and philosophy, we have been given the task to pursue the elements of market power within the agricultural establishment and to analyse the adequacy of its utilization. Too little or too much power; how does one utilize the tools of economics, from such widely separated schools of economic thought, to measure departures from such elusive norms? The term "power" is filled with normative value judgments of right and wrong. One simply cannot win in this exercise. The dilemma of the "two handed" economist comes to mind. On one hand the "pure" economists will line up the precise elements of the competitive model, ready to invoke the spirits of Marshall and Freidman in debunking our professionalism in economics, if we dare move away from the guideposts of "pure" economics. On the other hand, the institutionalized pragmatists will press their "unclean" thoughts through the views of Bain, Galbraith and their disciples, who in turn will "yell" in clear unison that we have sold out to the highest bidder, if we ignore their particular truths. This paper will be saved from this particular pincer movement, by outflanking the "pure" economist with a straightforward statement of our philosophical

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views. Our brief discussion of "power" will be made within the limitations of the theory evolving from effective or workable competition. We will leave the precise, empirical analysis to another day, for the inexact but more meaningful world of reality. We will, however, bear in mind economic studies that are available, because we are ever mindful of the power of analytic economic work instilled in efficient computers. However, the dominant role in our thoughts will evolve around the concepts of equity, countervailing forces and performance.

Perhaps a more modest goal then, for our brief discussion of power, might be summed up by a statement by John Kenneth Galbraith. He comments, "I cannot ask you to go out and comfort the afflicted; that would be considered eccentric. But perhaps you can afflict the comfortable." Our goal then is to proceed through the problem of measurement and reality to the evaluation (discussion?) of use or misuse of market power inherent within the agricultural sector of Canada.

Power in Economic Theory

"Power is primarily a relationship, for the power wielder exercises control over some other person."[1] Therefore, power exists in the relationships between people and is thus a social phenomena. In order to integrate this idea with the study of economics it is necessary for economics to have a social dimension. This is evident in the following statement: "The problems of economics arise out of the use of scarce resources to satisfy human wants."[2] As individuals participate in the economic system, interaction occurs and with it comes the opportunity for power to play a part in determining how these wants are satisfied.

The issue of power within the discipline of economics is not new. It was evident as a concept to the classical economists, however, it was not singled out as a matter of concern until the early 1900's when it was realized that production was becoming more and more concentrated in the hands of large corporations.[3] Since that time much has been written, mostly within the field of industrial organization by such authors as Bain, Schumpeter and Clark.[4] Galbraith too, has contributed to the literature on the subject. His development of the thesis that competition could come from the opposite side of the market gave rise to the theory of countervailing power.[5]

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[1] Charles F. Andrain, Political Life and Social Change, (Duxbury Press, 1975), p. 97.

[2] Richard G. Lipsey, et al., Economics, (Harper and Row, 1976), p. 6.

[3] William G. Shepard, Market Power and Economic Welfare, (Random House 1970), p. 13.

[4] Ibid, p. 18.

[5] John K. Galbraith, American Capitalism, (Riverside Press, 1952), p. 118.

In spite of the effect power can have on economic relations and, in spite of the abundance of literature on the subject, economic theory does not take power directly into account.[6] Neoclassical theory posits several basic models of the marketplace. By combining the selling side with the buying side, a theoretically complete model of the market can be constructed. The price-quality solution is given where demand equals supply. Problems can arise, however, since in some instances the price-quantity outcome is indeterminant. In these instances the price-quantity outcome cannot be determined solely by the intersection of the agents' marginal cost and marginal revenue curves. There are limits defined by these curves. The outcome, however, depends on the bargaining power of the two parties. Therefore, in most situations economic theory cannot determine the final outcome.[7] In market structures, not characterized by perfect competition, inter-personal relations play a significant role in determining the outcome. This is especially so for situations best described as oligopolistic. One of the central notions in oligopoly theory is that rivals' actions must be considered when setting price and output.

Neoclassical theory does not take power directly into account. It states that it is the rational behavior of equating marginal cost and marginal revenue that explains the outcome rather than the exercise of power. However, there is an approach which gives more recognition to the concept of power. This alternative approach is called industrial organization and it "... an applied branch of neoclassical theory."[8] In such an approach the concepts and postulates of theory are measured against reality, hence the literature tends to be a blend of qualitative and descriptive material. In dealing with the problem of oligopoly and market power, the industrial organization method first recognizes the market's structure and the conduct of economic agents. It then can draw conclusions on performance based on empirical evidence. However, despite some valuable extensions of theory, industrial organization concepts have not been able to provide models in which power acts directly in determining a price-quantity solution.

However, power is a pervasive concept and can have an impact not only within a particular market structure but also on the type of market structure in existence. In other words, power can be considered a determinant

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[6] J.J. Richter, "Are Marketing Boards an Effective Countervailing Power?" Agricultural Marketing Boards, Sixth Annual Workshop Report, Canadian Agricultural Economics Society, Saskatoon, 1961, p. 5.

[7] Ibid. p. 3.

[8] William G. Shepard, The Economics of Industrial Organization, (Prentice Hall, 1979), p. 25.

of market structure. In this regard industrial organization provides some insight as to how power can effect the nature of the market. The literature notes that factors such as technology, elasticity of demand and supply, input prices, and government policy can influence the market's structure.[9] Since interpersonal relations may be a part of some of the structural determinants, especially government policy, there is scope for power to effect the type of organization that characterizes a market. For example, the lobbying by business organizations and labor unions of government could result in changes in the market structure. To the extent that these groups are powerful, and indeed use their power, the chances that market structure will be effected are increased. Once the use of power has been justified, it will work with the other structural determinants to shape the structure of the market. However, once the use of power has been influential with respect to market structure, its relevance does not end there. With the exception of perfect competition, the concept of power is at work within the very structure it helped to create.

Market power is defined as "the ability of a market participant to influence price, quantity, and the nature of the product in the market."[10] The most potent form of market power according to theory is that possessed by the monopolist. The monopolist uses his discretion to set output wherever he wants, which, by the assumption of rationality, will be where profit is maximized. Theory also says that the rational monopolist not only has the power to restrict output but will indeed do so. In this regard we might note that provincial marketing boards in Canada, with the power to restrict supply, reached 46 in 1981.[11] Therefore, market power is evident in Canadian agriculture.

Supply restriction may be the strongest form of market power but there are other measures which fall into the same category. Wood recognized product promotion and orderly marketing in addition to supply restriction as techniques that could enhance producer prices.[12] The common dimension of these three measures is that all of them raise producer prices at the expense of the consumer. Product promotion involves techniques that make the product more attractive through such means as quality regulation and advertising. The main objective here is to cause an outward shift of the demand curve. This involves taking advantage of time and place to discriminate against purchasers through varying price.[13]

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[9] Ibid, p. 5.

[10] William G. Shepard, Market Power and Economic Welfare, (Random House, 1970), p. 33.

[11] Agriculture Canada, Canadex, Powers and Procedures of Provincial Marketing Boards, 1981, No. 847.

[12] Arthur W. Wood, "The Marketing Board Approach to Collective Bargaining," Journal of Farm Economics, Dec. 1967, Vol. 49, No. 5, p. 1371.

[13] Ibid, p. 1371.

Wood also listed three other methods marketing boards could employ to increase prices. These are essentially structural features hence their institution, in relation to the concept of power, would involve interpersonal contact outside the market mechanism. In other words, the decision to implement these methods involves personal contact between agricultural marketing group leaders and industry officials. The decisions reached do not directly specify price or output but rather specify the nature of the mechanism through which price and output will eventually be determined. For example, one of the measures included in this category is the implementation of a central selling mechanism. The decision by market participants to use such a mechanism involves a brand of power different from market power since the mechanism does not directly determine the price-quantity solution but does instead provide a means to reach such a solution. Deciding on the means through which the price-quantity solution will be reached is a decision regarding the structure of the market. Therefore, to the extent that the concept of power arises in this decision making process, power is a determinant of market structure.

In addition to the implementation of a central selling mechanism, two other structural adjustments can be made that may lead to increased prices. These are the performance of market services and the compulsory rationalization of marketing functions. Performing market services involves vertical integration into the stages that follow primary production. For example, a marketing board could establish its own processing or distributing facility. The rationalization of marketing functions involves an improvement in the logistics of moving the product and may be accomplished through such measures as reduced cross hauling and reduction of excess capacity.[14]

The measures that marketing boards can take to enhance price, then, include actions that can be categorized under market power and also those that can be considered structural changes. These actions are not clearly separable since structural changes can, and usually do, lead to more or less market power.

Evaluation - Market Structure

We will present several questions which we hope will reflect our introductory comments. The answers to these questions we trust will cast some light on the task.

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[14] Ibid, p. 1372.

Have rural people and their organizations been successful in changing market structure? The answer, in Canada, has to be an obvious yes. Marketing boards, cooperatives and newly directed private enterprise organizations, all present very different structural forms than those which exist in early economic literature. Changes have occurred.

We have seen competitive situations develop. As an example, the Ontario Pork Producers Marketing Board has increased the competitive atmosphere throughout Canada in the pork industry. Conversely, milk marketing boards have concentrated production. An increasingly more popular structural component is vertical integration. Included in this structural concept are the concepts of ownership, contracts and their older but more recently discovered brother, the informal contract or arrangement. This latter concept enters the structural discussion as a refugee from market conduct. However, when placed in the realm of power, informal arrangements become structural in nature and any analysis of structure which is undertaken without a full understanding of the current informal arrangements in the marketplace is doomed to mediocrity and irrelevance. Examples of vertical arrangements put into place by agriculturally related institutions abound in the marketplace.

Amongst other market structural variables that have become important to agriculture is product differentiation. To change or alter demand is an exhibition of market power. Few would deny that milk, eggs, pork, cheese, and rapeseed in Canada have not had considerable success in this area. The story for other commodities is less clear. What is certain, is that the homogeneous nature of agricultural products is now in serious dispute. In this regard, social scientists have not as a group added much to the discussion. They have continually relied in their thinking on straight line demand curves and their dependence on historical based elasticity coefficients in predicting changes in demand. This activity has led economists to be of little use to hard pressed cattlemen and their declining market, both in anticipating the decline and evaluating the impact of their efforts to increase demand.

Rural conceived concepts have effectively altered market structure. Numbers of sellers have been reduced, production restricted, products differentiated, and selling procedures changed. The outward structure of the marketplace for agricultural products has been altered by producer power and power once discovered and utilized has successfully altered the inner workings of the institutions set in place by the new landlords.

Evaluation - Market Conduct

Has the degree of interdependence in the marketplace increased in the last several years? The fact that the question assumes interdependence between producers and the other actors in the food system gives our view that independent factors within the competitive model have not been a reality within the food sector for many years. In this argument, however, we are now concerned with the increase rather than debating when innocence left our market conduct considerations.

The changes in market structure both vertically and horizontally have led to fewer sellers and buyers of agricultural products. Therefore, one might assume that interdependence would naturally increase. The visible tools of interdependence reflect standing orders, buying and selling programs, formula pricing and price bargaining. All of these reflect the nature of a mature disciplined marketplace, where quantity and quality must be available 52 weeks of the year.

Interdependence has also brought to the marketplace a respect for problems inherent in excesses of price activity. Prices are informally projected by the price leader and price competition or active daily markets become less a part of market conduct. Domestic markets become difficult to enter as cash markets diminish in number and conduct variables in the nonprice variety become pseudo-structural in nature.

Agricultural marketing agencies and their counterparts on the purchasing side sit down and plan industry strategy. What anti-trust frowns on between firms becomes easily accomplished when orchestrated by a marketing board. As an example, prices, margins, market shares, growth and product specifications have been arrived in an amicable fashion by the feather industry participants within most provinces. Awareness of power and its difficulties if abused have led to mutual interdependence of industry participants.

Interestingly enough, while the beef marketing system has developed towards an efficient, interdependent system between retailers and processors, power inherent in the cattlemen's lobby has to date successfully repelled federal advances towards increased interdependence at the producer level. This is another use of power. Power utilized to maintain competition. One might also note that the railways have not increased freight rates for beef cattle moving to Ontario, in recent years, without consultation with cattlemen's organizations. Unheard of a very few years ago, this is another manifestation of interdependence and mutual respect of power.

We have briefly explored structure and conduct variables and the development of power within their fabric. We now turn to the final and crucial question.

Evaluation - Performance

We have observed changes in structural variables, inflicted by agricultural producers upon society. We have observed the joining of producers, processors and retailers into an interdependent clan; in order to feed the nation in a comfortable inventory-free, atmosphere. Can we arrive at a fair judgment of performance as to whether the power achieved by agricultural people and their institutions is too much or too little to affect the final outcome for society?

Economic data are limited in availability and comparisons of performance are difficult. This situation has not, however, limited members of our profession from making profound judgments on the performance of the food marketing system. As an example of continued evaluations which lead to alleged large quantitative dollar losses to consumers, consider the continued onslaught on the performance of producer marketing boards which allocate production quotas. One can genuinely worry about the inflation of quota values and their subsequent capital gain increase impact on forthcoming generations of producers and consumers with some justification. However, to lead the attack with a straightforward comparison between United States and Canadian retail prices and to attribute the entire difference as a "tragic" loss to the Canadian consumer, is a misuse of economic logic of the highest order. One might safely make some sweeping generalizations, but to lay the differences on the doorstep of a particular Board ignores the structural and interdependent conduct factors listed previously. To state that agricultural producer power by itself could push consumer prices to these new found heights ignores the reality of a highly concentrated Canadian marketplace and a cooperative anti-trust policy within Canada. Aside from the economic "grandstanding" of rationally trained economists in utilizing such comparisons to make someone elses point, there is a considerable list of interventionists to this scheme, such as; exchange rates, genuine differences in production costs, lack of economies of scale in our smaller market area, structural preferences by all levels of market participants and the desired multiplier effect within Canada. All of these factors included with equity, countervailing power and society's other chosen goals make the economists' path difficult.

We cannot, therefore, compound our lack of credibility by wishing all of the explanation of the observed differences in price levels against the producer power base. Suffice it to state that we can look at treasury transfers and quota values and ponder their nature and extent. As economists we can correctly draw to the attention of policy makers the costs in economic terms of quota policies provided of course, the multiplier or secondary benefits receive some attention.

As to the total evaluation of the performance of farmer organizations, their goals are genuine and they encompass a much wider field for consideration than do traditional economics. Price, income and quantities are often the least attractive variables in measuring the effectiveness of their total performance. Considerations of market share, market security, uniform high quality, the integrity and structure of the market, innovation, food security and pricing efficiency are also necessary. To this list must be added the collective choice of agricultural producers to sell their products in a manner which is satisfactory to themselves. In a democratic society the rights of organized labour, businessmen, consumers and agricultural producers will continue to be developed within our political processes. Economists had in all events better be sure that they understand reality and count their words and activities in line with pragmatism. The extremes of Chicago and Moscow make poor bedfellows in a society which has approached the new industrialized age with mixed enthusiasm.

Producer power has stabilized some commodity producer incomes, established basic floor prices for others, increased consumer demand, developed new external markets, improved information systems, challenged grade standards, instituted legal action in anti-trust matters and prodded researchers. The list is not complete but it will suffice to make the point that producer power has influenced the marketplace and its performance.

On the other hand, producer power has not been able to affect substantially, in recent years, federal participation in research, the excessive utilization of the land base for urban needs, the implementation of meaningful anti-trust laws, the elimination of the wasteful practices of compulsory castration of hogs and bulls, the restrictions of agricultural trade with the United States and the European Economic Community. In addition, some would say with some positive enthusiasm in regard to their failure, their ability to eliminate the violent excesses of the various commodity price cycles and the continuous decline in farm numbers.

Concluding Remarks

Agricultural producers have market power. They have affected price, quantity and the terms of trade. Whatever the final assessment of their performance by society, they have indeed changed the structure and organization of commodity markets. Interdependence between producers, processors and retailers is a fact of life.

Indeed, a growing source of concern for society will be the increased cooperation between producer marketing boards and food retailers, as producer power becomes more openly recognized and retail market power consolidated. Conclusions in regard to total performance are mixed and controversial. Producers will claim few results. Consumers are bewildered. Pure economists are indignant and certain of continuing abuse. Institutional economists in turn are boisterously pragmatic as they attempt to blend economics with the reality of the marketplace. It is, however, an uneven effort, with few economic truths apparent. Scorned by the econometrician and policy makers, as they are forced into the narrow confines of people, institutions, and case study analysis, in their attempt to evaluate performance, institutionalists can only hope that the profession of agricultural economics can enlarge its current concerns and priorities with quantitative analysis, to work with marketing analysts as constructive voyeurs of the marketplace and the continuing evaluation of its performance.

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ECONOMICS OF LAND USE ISSUES*

Chairman: D.F. Kraft**

THE OPTION DEMAND MODEL: A PLANNING TECHNIQUE FOR RESOLVING THE CONFLICT BETWEEN RURAL RESIDENTIAL DEVELOPMENT AND AGRICULTURAL LAND

E.O. Prevost and D.F. Kraft***

The 1970's and early 1980's have witnessed the development of rural non-farm residences in the countryside surrounding cities. The demand for this type of development was most noticeable in the late 1960's and 1970's. Presently, demand for rural residences has slowed; however, lots continue to be subdivided and sold. These lots are located within commuting distance of industry and urban centres and range from half an acre to 40 acres in size. The residents have the advantage of close proximity to employment while enjoying the 'rural lifestyle.' The disadvantage is this development usually creates many social, environmental, and economic problems. One disadvantage is the loss of agricultural land.

When rural residential development locates on agricultural land, often more than the lot is taken out of production. Unplanned rural residences tend to locate on the periphery of a section of land on lots of various depths and widths. The lack of lot definition makes it difficult for the owners of the property located in the middle of the section to define their boundaries. Due to the high cost of land surveys the boundaries remain physically undefined and the land, being difficult to farm, often lies idle.

When rural residential development is planned and restricted to subdivisions, agricultural land is lost. However, the land adjacent to the lot usually remains in production. Sometimes it takes years until a subdivision is fully developed and, therefore, agricultural land is taken prematurely out of production. To avoid this situation, planning the location of a development is not enough; the staging of a development must be controlled also.

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*A paper by Frankenna and Scheffman, ECONOMICS OF PROVINCIAL AGRICULTURAL LAND POLICY, was not presented at this session and the presentation by Cuthbert, Barechello, and MacMillan, AGRICULTURAL-FORESTRY LAND USE CONFLICTS IN SOUTHEAST B.C., was not made available for these Proceedings.

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The major point is that rural residential development, planned or unplanned, continues to take agricultural land out of production. The development of rural residences alone will not create a significant impact on Canada's food producing capabilities. However, the agricultural land losses to all the land uses not related to agriculture are eroding Canada's food producing capabilities. Studies of the Canadian agricultural land situation have reflected these losses and have indicated that although agricultural land reserves are being brought into production, their size and soil quality are not sufficient to match losses.

The remaining agricultural land is being affected by salinization, erosion, nutrient depletion and loss of organic matter. Increased usage of chemicals, fertilizers, and pesticides raises agricultural production; however, the fact remains the quality and quantity of Canada's agricultural land is diminishing.

Rural residential development is one of the land uses responsible for taking agricultural land out of production. Public land use planning has been seen as the way of influencing the location of rural residential development therefore protecting agricultural land. However, planning as a method to control the loss of agricultural land has not been extremely successful. Based on the track record of federal and provincial programs and policies such as the Ontario Foodland Guidelines, the British Columbia Agricultural Land Reserves, and the Manitoba Provincial Land Use Policies, it appears they all fall short of their objectives. Generally, this failure occurred as a result of political pressure, as the majority of decisions take place in the political arena. Often vital pieces of information are not supported quantitatively and therefore not available to administrators and decision makers. For instance, the opportunity cost of using agricultural land for nonagricultural uses is generally unavailable. More specifically, the economic cost of transforming land from agricultural to rural residential use is underestimated as market prices do not account for all the opportunity costs. The rural real estate market cannot account for public good attributes associated with preserving land for agricultural uses. Land dedicated to food production provides a sense of security even though it may not be utilized directly by consumers. The issue addressed in this paper is if rural residential development is to be redirected to less agriculturally productive land sites, then what are the added private costs the public must bear to satisfy this public good. An Option Demand Model was used to quantify the opportunity cost of redirecting rural residential development to alternative locations. This paper presents the methodology and a case study indicating how this information can be used in the planning process.

Methodology

The Option Demand Model is structured to take into consideration and value the preservation option. In previous studies conventional cost benefit analysis either ignored or undervalued the preservation option. The Option Demand Model assumes once a development decision is made it is

irreversible and artificial restoration cannot be accomplished without extremely high cost. In spite of this, both rural residential development and agricultural land have a right to exist. Recognizing this, in this analysis the Option Demand Model was used as a development location model. The model by evaluating various sites for their preservation and development options will indicate which sites should be developed and which ones are to be preserved. It will provide information which administrators and decision makers can use to make and back up decisions. In this way the decisions that are made will allow both land uses to occur and the value of the opportunity costs foregone are minimized.

Figure 1 explains how the Option Demand Model operates. Of the two sites to be analyzed, one will be called Site 1 and the other Site 2. Site 1 always has the shortest commuting distance of the two sites. The first step is to calculate a stream of net benefits for both the preservation and development options for both sites. These net benefits are then discounted into present values. Next, the net benefits from developing both sites are subtracted as are the net benefits from preserving them. The resulting figures representing the development option and preservation option are added. This figure indicates the development decision. If the figure is zero or a positive number Site 1 is preserved and Site 2 is developed. This is because the preservation option is larger or equal to the development option. When the figure is negative and Site 1 has a lower agricultural soil productivity than Site 2, then Site 1 is developed and Site 2 preserved. The reason for this is the preservation option was not as large as the development option. If Site 1 has a higher agricultural soil productivity than Site 2 and the Development Decision figure is negative then the lot sizes are increased and the program run again. Through this process a lot size will be found which will change the development decision to a positive number or zero. When this occurs Site 1 should be preserved and Site 2 developed.

Case Study

The Option Demand Model was applied to two study sites located in the Rural Municipality of Rockwood, Province of Manitoba (see Figure 2). The study sites are each two sections in size, one located southeast of the Town of Stony Mountain and the other located southeast of the Town of Stonewall. The study sites have different agricultural soil qualities; however, they were chosen for their other similarities.

In applying the model to the study sites the costs and benefits of both the development and preservation options were researched. The development costs included variables such as:

1. the cost of installing a septic field,
2. the cost of tree bulldozing,
3. commuting costs or the cost of oil and gas, and
4. vehicle replacement costs.

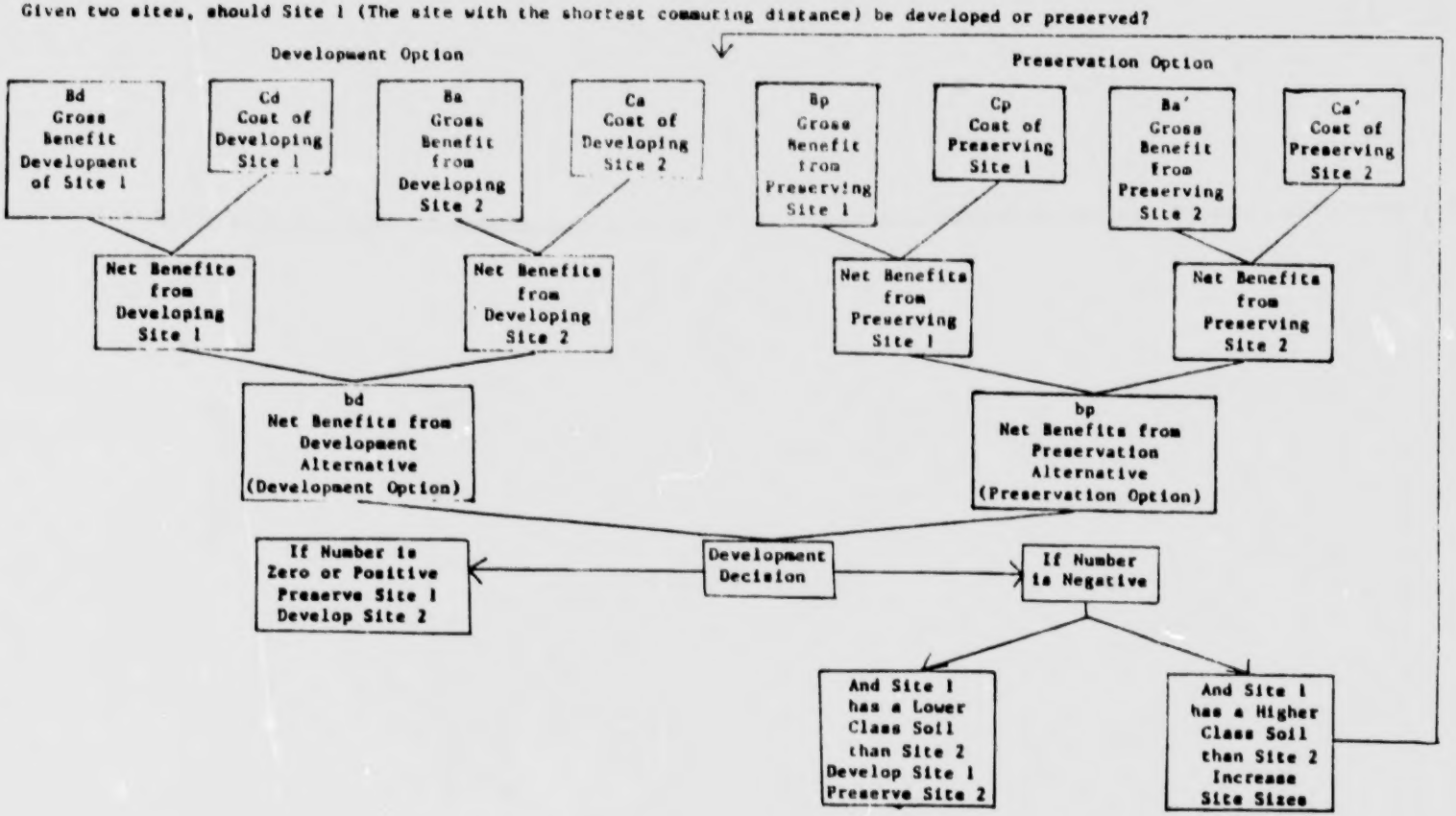

Given two sites, should Site 1 (The site with the shortest commuting distance) be developed or preserved?
Development Option
Preservation Option
Bd Gross Benefit Development of Site 1
Cd Cost of Developing Site 1
Ba Gross Benefit from Developing Site 2
Ca Cost of Developing Site 2
Bp Gross Benefit from Preserving Site 1
Cp Cost of Preserving Site 1
Ba' Gross Benefit from Preserving Site 2
Ca' Cost of Preserving Site 2
Net Benefits from Developing Site 1
Net Benefits from Developing Site 2
Net Benefits from Preserving Site 1
Net Benefits from Preserving Site 2
bd Net Benefits from Development Alternative (Development Option)
bp Net Benefits from Preservation Alternative (Preservation Option)
Development Decision
If Number is Zero or Positive Preserve Site 1 Develop Site 2
If Number is Negative
And Site 1 has a Lower Class Soil than Site 2 Develop Site 1 Preserve Site 2
And Site 1 has a Higher Class Soil than Site 2 Increase Site Sizes

Figure 1

Option Demand Model

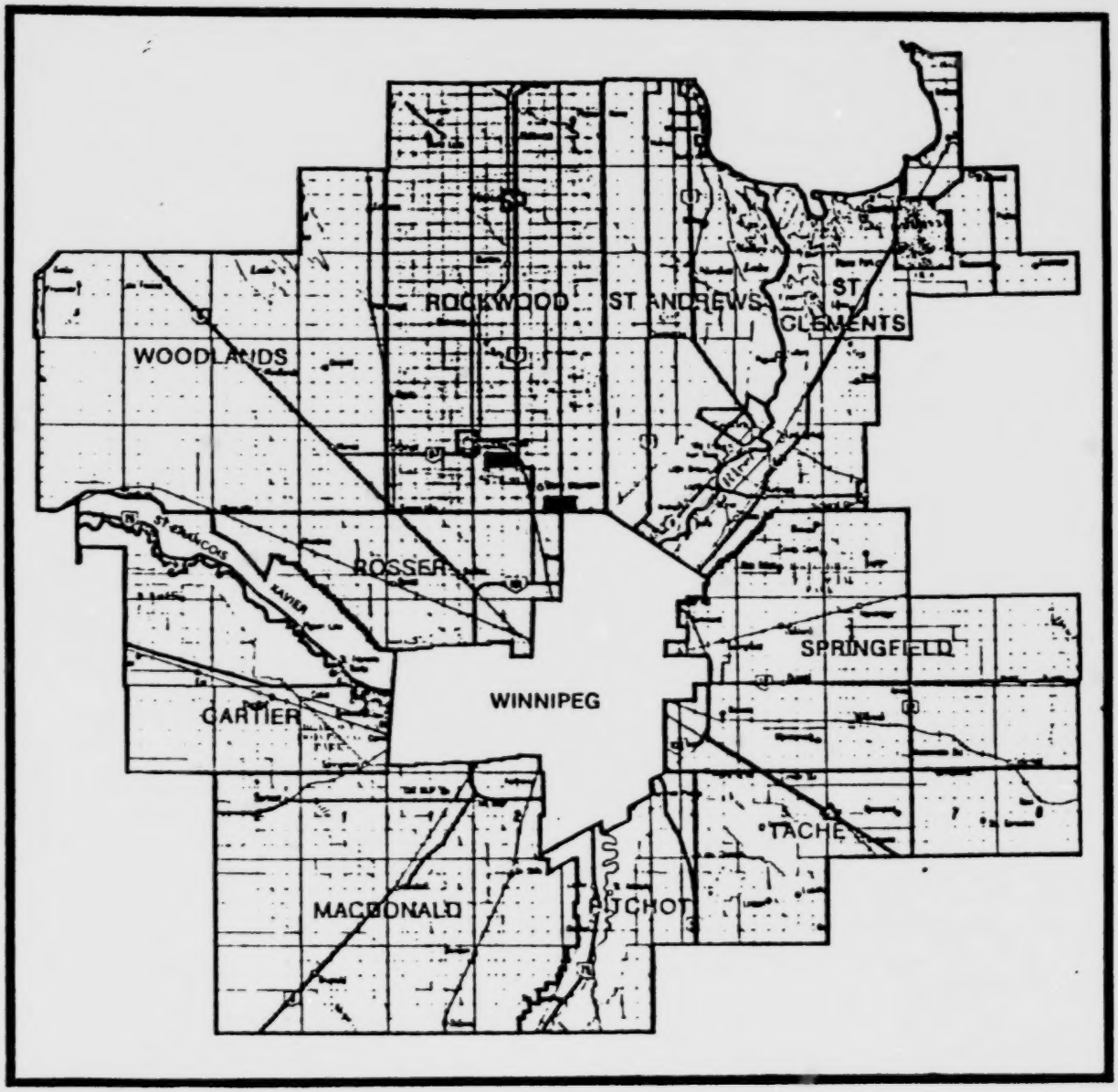


Figure 2

Rural Municipality of Rockwood - Site Location

The development benefits were reflected in the property values. In comparing the rural residential property values of the two sites, the results were inconclusive. It was therefore assumed the benefits derived from rural residential development in both study areas were equal and cancelled out in the equation.

The preservation benefits included variables such as the benefits derived from selling agricultural products (e.g., grain) and the benefits from increased property values. Studies indicated property values were higher the higher the agricultural soil quality. The preservation cost consisted of the production cost of the crop.

All these costs and benefits for the development and preservation options for the study sites were placed in a computer program. The results of the program are displayed on a table which consists of three columns (see Table 1). The first two columns are for the two sites which are being analyzed by the program. The site with the shortest commuting distance always appears in the left column. The column on the far right indicates the difference between the values listed in the first two columns. The top section of the table displays the development option for both sites and the bottom section displays the preservation option.

Upon examining the results of the application of the Option Demand Model to the Case Study, it is important to note the Stony Mountain site, the site with the shortest commuting distance, is in the first column. This site also has the lower agricultural soil quality. The results indicate the development costs for the Stonewall site ($1,341) are higher than those of the Stony Mountain site ($1,200). This is because trees had to be bulldozed and more gravel was needed for the septic field for the Stonewall site. The transportation and vehicle replacement costs are also higher for the Stonewall site as opposed to the Stony Mountain site. This is because the Stonewall site is located an additional eight kilometers farther from the employment centre. The subtotal of all these variables of the development option is a negative number ($-4,308). This indicates from the development perspective the Stony Mountain site should be developed and the Stonewall site preserved. Examining the preservation option, the total revenue crops indicate the difference in soil productivity between the two sites. The difference between the two sites is negative ($-581), indicating the Stony Mountain site should be developed and the Stonewall site preserved. The land sale revenue number ($0.95) is very small, therefore, has an insignificant affect on the preservation option. The total of the difference column is the summation of all the numbers in the third column. This figure indicates the development decision and whether the site with the shortest commuting distance, in this case the Stony Mountain site, should be preserved or developed. When this figure is a negative number and the site with the shortest commuting distance has the lower soil quality of the two sites this site will be developed and the other site preserved.

Table 1

Rural Municipality of Rockwood - Case Study

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,200.00	1,341.00	-141.00
Transportation Cost	13,998.99	15,834.95	-1,835.96
Vehicle Replacement	20,652.51	22,983.99	-2,331.48
Subtotal	35,851.50	40,159.95	-4,308.44
Total Revenue Crops	735.25	1,316.54	-581.29
Land Sale Revenue	-3.85	-4.80	0.95
Total			-4,888.79

If the Stony Mountain site still had the shortest commuting distance but had the high agricultural soil quality of the two sites, the results would change. Table 2 indicates the total revenue crops and development cost would become positive numbers and the land sales revenue a negative number. The Development Option would be a negative number ($-4,026), which indicates from this perspective the Stony Mountain site should be developed.

From a preservation option perspective, the number is positive ($581), indicating the Stony Mountain site should be preserved. The total of the difference column indicates the development decision is still a negative number ($-3,446). When the site with the shortest commuting distance has the higher soil quality of the two sites, as the Stony Mountain site has in this case, the site sizes should be increased and the program run again.

The results of increasing the site sizes to seven acres are indicated in Table 3. The total revenue crops and land sale revenue change by a multiple of seven. The total or development decision also changed and became a positive number. The fact the number is positive indicates the preservation option was larger than the development option. When this occurs, the Stony Mountain site is preserved and rural residents must commute a longer distance to the developed Stonewall site.

In order to experiment with the Option Demand Model further, all the variables of the model were tested for their degree of sensitivity and their impact on the results of the model. The variables which were the most sensitive and had the most impact on the study results were the cost per kilometer for oil and gas, the number of kilometers travelled from the site, the crop yield and the site size. These components provided the basis for testing the model. In the first experiment the cost per kilometer for oil and gas was reduced. The type of car used was changed from the mid-size Chevrolet Malibu to the compact size Volkswagon Rabbit. The latter achieves better gas mileage and a lower cost per kilometer for oil and gas.

The result of changing the cost per kilometer for oil and gas by using a small car are shown in Table 4. Table 5 indicates the results when a mid-size car is used. Comparison of the tables indicate a small change occurred between the transportation cost and, therefore, the total. It can be concluded by changing the type of car used, therefore, the cost per kilometer for oil and gas, the development option is not significantly reduced in terms of influencing the decision whether a site should be developed or preserved. If the distance between sites had increased, perhaps the change in transportation costs might have been more significant. Due to this point, the results found in this example are not necessarily those which may be found in other examples.

In the next experiment, the number of kilometers travelled to and from both sites were changed. This was done by changing the employment centres. Two of the centres compared were Inkster Park and downtown

Table 2

Stony Mountain Site - High Quality Agricultural Land
Stonewall Site - Low Quality Agricultural Land

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,341.00	1,200.00	141.00
Transportation Cost	13,998.99	15,834.95	-1,835.96
Vehicle Replacement	20,652.51	22,983.99	-2,331.48
Subtotal	35,992.50	40,018.95	-4,026.44
Total Revenue Crops	1,316.54	735.25	581.29
Land Sale Revenue	-4.80	-3.85	-0.95
Total			-3,446.09

Table 3

Stony Mountain Site - Higher Quality Agricultural Land
Stonewall Site - Low Quality Agricultural Land -
Size of Sites Seven Acres

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,341.00	1,200.00	141.00
Transportation Cost	13,998.99	15,834.95	-1,835.96
Vehicle Replacement	20,652.51	22,983.99	-2,331.48
Subtotal	35,992.50	40,018.95	-4,026.44
Total Revenue Crops	9,215.79	5,146.73	4,069.05
Land Sale Revenue	-33.6	-26.95	-6.65
Total			36.41

Table 4

Option Demand Model - Small Car

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,200.00	1,341.00	-141.00
Transportation Cost	13,017.71	14,724.95	-1,707.24
Vehicle Replacement	20,652.51	22,983.99	-2,331.48
Subtotal	34,870.22	39,049.94	-4,179.72
Total Revenue Crops	735.25	1,316.54	-581.29
Land Sale Revenue	-3.85	-4.80	0.95
Total			-4,760.07

Table 5

Option Demand Model - Mid-Sized Car

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,200.00	1,341.00	-141.00
Transportation Cost	13,998.99	15,834.95	-1,835.96
Vehicle Replacement	20,652.51	22,983.99	-2,331.48
Subtotal	35,851.50	40,159,95	-4,308.44
Total Revenue Crops	735.25	1,316.54	-581.29
Land Sale Revenue	-3.85	-4.80	0.95
Total			-4,888.79

Winnipeg (see Figure 3). Inkster Park has the shorter commuting distance. Comparison of the difference columns of Tables 6 and 7 indicated the transportation cost differences were all equal and the vehicle replacement difference was only slightly different. This slight difference is due to the rounding off effect that occurred when the value of the residual car life is subtracted from the car replacement cost at the end of the study period. In conclusion, changing the commuting distance the rural residents must travel does not affect the results of the program, the preservation option or the development option.

The assumptions underlying the next experiment were:

1. the destination of rural residents is downtown Winnipeg,
2. the location of Site 1 will remain fixed, have a total commuting distance of 61 kilometers, and its highly productive agricultural soil will produce 26.8 bushels per acre of Red Spring wheat,
3. Site 2 will have equal or greater commuting distance than Site 1 and its lower quality agricultural soil will produce only 21.3 bushels per acre of Red Spring wheat,
4. the car being driven by rural residents is a Chevrolet Malibu, and
5. the distance between the two rural residential sites will begin at zero and increase one kilometer intervals.

Programs were run and the results are indicated in Figure 4. They indicate the farther apart the sites were located, the larger the site sizes had to be to preserve Site 1 and redirect development to Site 2. Any situation that could be classified in the grey section of Figure 3 means Site 1 should be preserved and Site 2 developed. For those situations falling in the white section of the chart, Site 1 should be developed and Site 2 preserved.

For the final experiment, the distance between sites, the site size and the agricultural soil quality of the site were varied. In setting up the analysis the assumptions were the same as used in the previous example, except three different combinations of agricultural soil quality for the two sites were used (Table 8). The results are indicated in Figure 5. The different lines on this chart indicate the various soil quality differences that exist between the two sites. The individual line represents those points where the development decision for Site 1 has been overturned and Site 2 developed instead. As the chart illustrates, the farther the sites are apart, the larger the sites have to be in order to overturn the development decision. The larger the difference in soil quality between the sites, the farther the line appears to the right of the chart. This is because the larger the difference in soil quality, the farther the sites can be apart before the site size has to be increased in order to overturn the development decision on Site 1 - the site with the higher quality of agricultural soil. From this it can be concluded the larger the difference in soil quality the more options open to preserving Site 1 in developing Site 2.

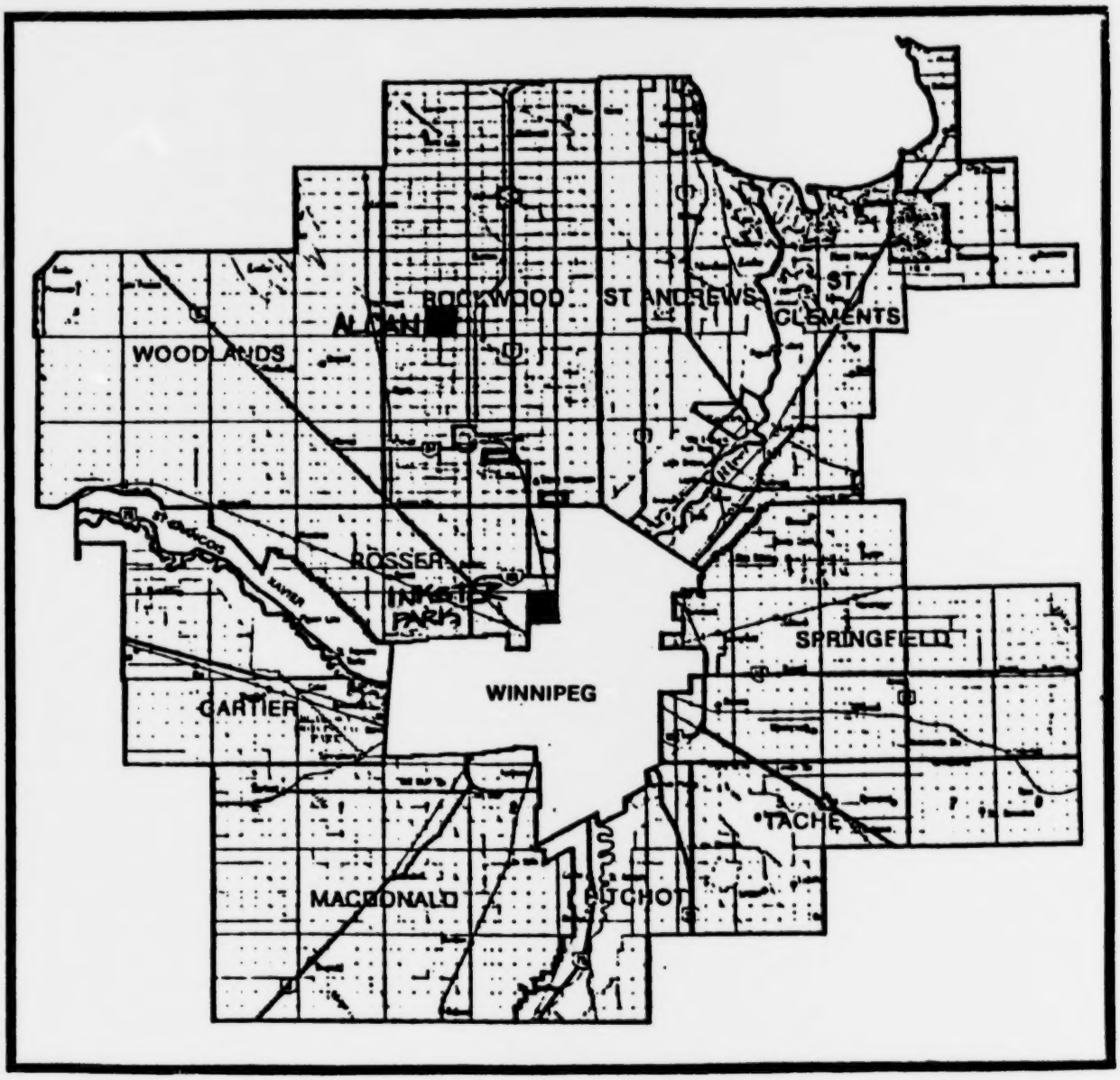


Figure 3

Rural Municipality of Rockwood - Site Location

Table 6

Downtown Winnipeg Employment Center

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,200.00	1,341.00	-141.00
Transportation Cost	13,998.99	15,834.95	-1,835.96
Vehicle Replacement	20,652.51	22,983.99	-2,331.48
Subtotal	35,851.50	40,159.95	-4,308.44
Total Revenue Crops	735.25	1,316.54	-581.29
Land Sale Revenue	-3.85	-4.80	0.95
Total			-4,888.79

Table 7

Inkster Park Employment Center

	Present Value Stony Mountain	Present Value Stonewall	Present Value Difference
	----------dollars----------		
Development Cost	1,200.00	1,341.00	-141.00
Transportation Cost	10,327.12	12,163.05	-1,835.94
Vehicle Replacement	15,865.02	18,346.30	-2,481.28
Subtotal	27,392.14	31,850.36	-4,458.21
Total Revenue Crops	735.25	1,316.54	-581.29
Land Sale Revenue	-3.85	-4.80	0.95
Total			-5,038.56

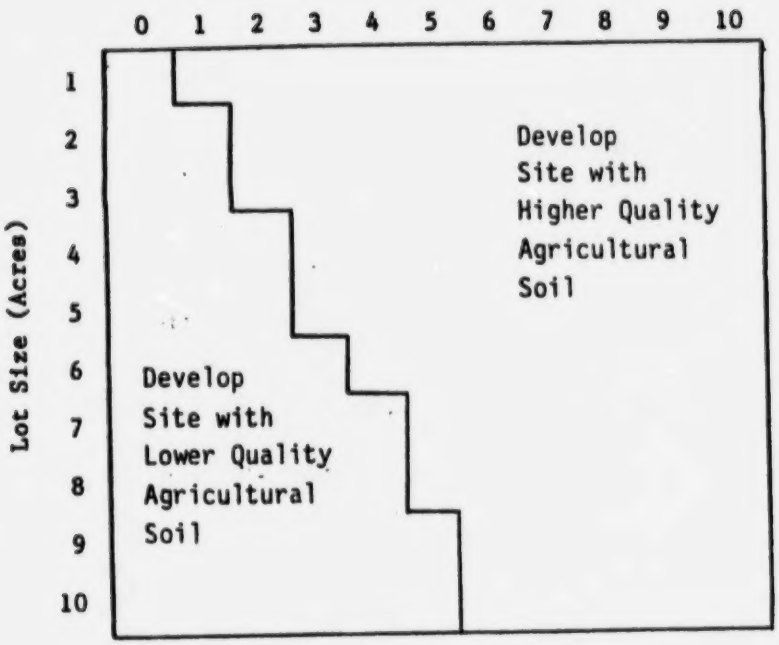


Figure 4

Variation of Commuting Distance and Site Sizes
Difference in Commuting Distance Between Sites
(Kilometers)

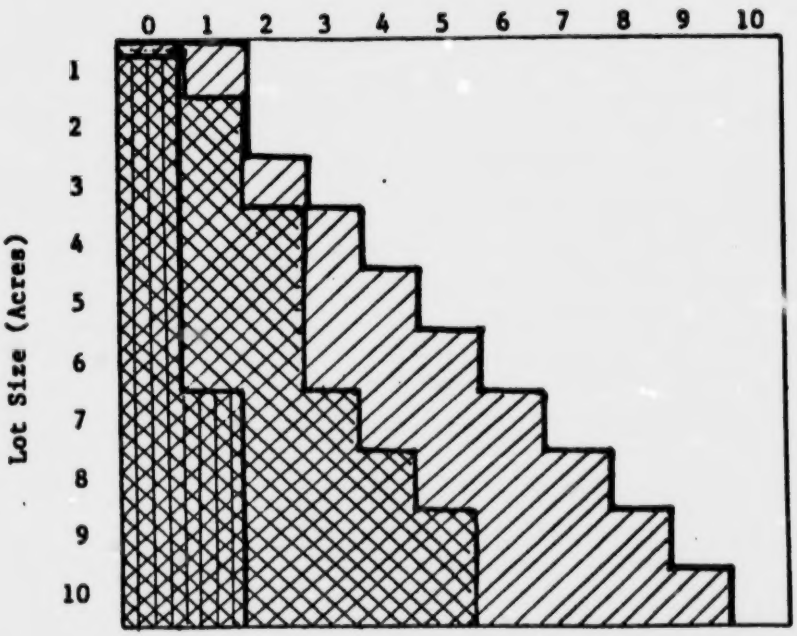
Table 8

Manitoba Crop Insurance Rates for the Rural Municipality of Rockwood

Class	A	B	C	D	E	F	G	H
Bushel/Acre	30.3	28.8	26.8	26.8	26.8	24.4	21.3	21.3

Combinations of Soil Quality Used in Study (Bushel/Acre)

	Combination 1	Combination 2	Combination 3
Site 1	30.3	26.8	30.3
Site 2	28.8	24.4	21.3
Difference	1.5	4.4	9.0



1.5 Bushel/Acre difference between sites, preserve site with higher quality agricultural land.

4.4 Bushel/Acre difference between sites, preserve site with higher quality agricultural land.

9.0 Bushel/Acre difference between sites, preserve site with higher quality agricultural land.

Develop higher quality site.

Figure 5

Variation of Commuting Distance, Site Sizes, and Agricultural Soil Quality

Difference in Commuting Distance Between Sites (Kilometers)

Conclusions

Before conclusions are drawn, it is essential the following caveats be indicated. First in setting up the model certain assumptions were made concerning the future. Variables, which may be relevant later on in the study period, could not have been accounted for in the model. The values assigned to the variables could also be incorrect. However, the assumptions made here about the future were based on the best information available at this time. The second caveat deals with the values of the variables of the case study. Since they are the direct result of the circumstances surrounding the case study, the results of the analysis may not necessarily be the same in other case studies.

Recognizing these caveats, several conclusions can still be drawn from using the sites from the Rural Municipality of Rockwood for a case study. When the site with the shortest commuting distance has the lower quality agricultural soil of the two sites, that site will always be developed and the other site preserved. When the site closest to the employment centre has the higher quality agricultural soil, it may be preserved or developed depending on the difference in soil quality between the sites, the distance between them and their size. The size of the rural residential parcels may be restricted in certain provinces, municipalities or districts which have their own planning documents. If the maximum parcel size allowed is two acres, sites having a difference in yields of 20 percent to 40 percent could only be located up to one kilometer apart before the site with the higher quality agricultural land and shorter commuting distance was developed. As site sizes increase, there are more options available for preserving the higher quality agricultural site and developing the lower quality one. Increasing site sizes results in wasting more agricultural land. If the site sizes are to be kept to a minimum, this restricts the options available. If, however, the development option is only slightly larger than the preservation option of the two sites, then administrators and decision makers may recommend the site with the higher quality agricultural soil be preserved. In doing this, administrators and decision makers are allowing the option to be preserved under a wider variety of circumstances. The reason the number of options available are restricted is because of the significant impact the fuel consumption and vehicle replacement costs have on the results.

Recommendations

The federal and some of the provincial governments have been involved in land use planning and regulation. One of the objectives of these agencies was to protect prime agricultural land; however, these initial objectives are being undermined. One of the reasons politicians give for this deterioration in land use allocation is the lack of necessary information to reject subdivision applications. The Option Demand Model should be used with other techniques to fill this information void allowing better planning decisions to be made. The Option Demand Model should not be

restricted to resolving conflicts between agricultural land and rural residential development. This method can be used to calculate the preservation value of recreation lands, wildlife areas, areas of historical significance, and other hard to measure, previously ignored land uses. Their development options, whether industrial, commercial or a transmission line, can be calculated also. In this manner, better land use decisions can be made in all areas. More research involving this model is recommended. Administrators and decision makers still do not have all the information or techniques they need to make the best planning decisions concerning land use allocation. However, presentation of the Option Demand Model has brought the achievement of this goal closer.

EFFECTS OF URBAN INFLUENCE ON AGRICULTURAL LAND USE

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Agricultural land use is highly affected by urban influence. The conference theme is, therefore, of great relevance for our subject. How, why, and to what extent is land use affected? Before answering these questions, the space around urban centres needs to be explored briefly.

The focus of this paper is on the area surrounding large cities. In the literature, the area around urban centres is divided into several sub-areas, such as the urban-rural interface, usually called urban or urban-rural fringe; the urban shadow zone; the commuting zone; and the urban field (Russwurm). All these distinctions are not so useful for our purpose, although it is important to distinguish two areas, the urban-rural fringe and the urban shadow zone. The fringe is the area immediately surrounding the built-up edge of the city. The size of the fringe varies with the size of the city. Russwurm mentions a distance from the built-up city limits to three to five miles for small and intermediate cities and eight to 10 miles or more for large cities. The fringe is characterized by a mixture of urban and rural land uses. Conflicts among these uses are usually severe, particularly if the area is poorly planned. Agricultural land use in this area is often subject to problems, such as vandalism, theft, damage to farm machinery and fixed equipment, and the worrying of livestock by dogs. This is well documented, particularly in the British literature (Ministry of Agriculture, Fisheries and Food).

The urban shadow zone is the area between the urban-rural fringe and the almost-completely rural countryside. It can extend for 20 miles beyond the urban-rural fringe. The dominant land use in this area is rural. A casual observer may not see much difference in land use between the urban shadow zone and the completely rural countryside. However, there are differences. The amount of idle land and land not used for agriculture but for other rural uses such as forestry or recreation is usually much greater than in the agricultural hinterland of comparable soils and climate. Nonfarm residences are also more frequent in this zone. There are also differences in the appearance of agriculture. Dilapidated farm buildings, dead elm trees in the fields which are not removed, and unkempt fences are not unusual. Moreover, agriculture does not look as prosperous. Agricultural productivity seems to fall behind that in the completely rural countryside. These characteristics are more pronounced the closer one gets to the fringe area. It is important to realize that the effects of urban invasion on agricultural land use are strongest in the urban fringe and taper off through the shadow zone until these effects almost vanish in the agricultural hinterland.

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The emphasis of this paper is on a comparison of some macro aspects of the use (or nonuse) of agricultural land in the urban fringe and shadow zones with that in the completely rural countryside, although available data make it impossible to differentiate these zones accurately. Data availability makes it necessary to examine the problems on a county basis. These political boundaries do not necessarily coincide with the areas indicated above. The focus is on land productivity and rural uses of land. The paper also examines briefly the causes of differences in land productivity and rural land uses between the urban fringe and shadow zones and the completely rural countryside.

The area of investigation is southern Ontario, with metropolitan Toronto and the Golden Horseshoe (Oakville, Burlington, Hamilton) as the major urban centres. Counties surrounding these areas will be called "urban" namely Halton, Peel, York, Durham, and Hamilton-Wentworth. This does not imply that these counties are entirely made up of urban fringe and shadow zones. They may contain completely rural countryside, such as in the northern parts of York and Durham. In the analysis, agriculture is compared with "rural" counties, namely, Huron, Perth, Oxford, Brant, Waterloo and Wellington. Again, all these counties do not contain entirely rural countryside, urban centres such as the Kitchener-Waterloo-Cambridge area and Brantford will exert urban influence in Waterloo and Brant. Moreover, urban influence from the metropolitan centres spills over into these rural counties to some extent, as in the southern parts of Wellington and Brant. Nevertheless, the urban counties are largely composed of urban-fringe and shadow zones, while the rural counties are predominantly rural. All the above counties are located in a climatic region which is not too disparate in temperature; roughly in a band between 2,500 and 2,900 corn heat units. Since climate is an important determinant in agricultural productivity, the choice of these rural counties is based on their rough similarity in climate and soils with the urban counties.

Impact of Urban Influence on Agricultural Land Resources

Urban influence appears to result in inefficient use of agricultural land resources. This problem has two facets: (a) much land remaining in agriculture is inefficiently utilized; (b) much idling or low intensity uses occur on land which could be used for agriculture. These propositions will be considered in greater detail below.

Comparisons of Agricultural Land Productivity

One of the most striking differences between urban and rural counties is the diversity in land productivity. Whether or not this is the result of inefficient land use must be explored in greater detail. The focus of this section is on providing factual information on the growth of land productivity over time, and on the levels of physical yield in both urban and rural counties.

Productivity Growth. Growth in land productivity in urban counties falls behind that in rural counties.[1] Table 1 summarizes the annual compound percentage growth rates in physical yields per acre of seven major crops covering roughly 85 to 95 percent of the area under crops in 10 counties between 1965 and 1980. A trend value is computed from annual physical yield data. In those cases where the regression coefficient of the trend has a significance level of more than .30 by a two-tailed t-test, the coefficient is considered not to be significantly different from zero. The compound growth rates are obtained from the computed 1965 and 1980 trend values. As Table 1 indicates, a marked difference in growth rates of physical yield per acre is evident between urban and purely rural counties such as Perth, Oxford and Huron.

Growth in overall land productivity not only depends on the yield increases per unit of land over time for a particular crop, but is highly affected by substituting high yielding crops for low yielding ones. It is much more difficult to construct a productivity index which takes this substitution effect into account; this requires a single index for all the crops.

One method of bringing the various crops to a common denominator is to express them all in their nutrient content per acre. The difficulty, however, is that nutrient content is not a single unit, but consists of protein, energy, etc. For our analysis we make the assumption that price differences among crops express nutritional differences, otherwise substitution would take place.[2] In order to smooth out short-run price disturbances, an average price for the period 1976 to 1980 is computed for all crops. Yields can now be multiplied by these prices and added to form a single index.

Although it is reasonable to assume that price differences express nutritional differences, this assumption cannot be made for hay and corn silage. These products are mainly consumed on the farm and only the surplus crop fetches a price. Due to its bulkiness, these prices are highly affected by transportation costs. The nutritional value of hay and corn silage on the farm is therefore much higher than their prices indicate. The nutritional value of hay is calculated to be 1.8 times and that of corn silage is twice as high as their prices denote. These correction factors are used in constructing a single crop productivity index.

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[1] For the purposes of productivity comparisons, Durham county has been omitted from the analysis because its borders changed substantially between 1965 and 1980. Consequently, comparable yield figures over this period are unavailable.

[2] The dominant use of all crops included is for feed, with the exception of Winter wheat, which makes up a small proportion in all counties.

Table 1

Annual Compound Percentage Growth Rates of Physical Yield per Acre of Various Crops in Various Counties in Ontario, 1965-1980[a]

County	Winter Wheat	Grain Corn	Mixed Grain	Hay	Barley	Oats	Fodder Corn
Perth	2.80[b]	1.19[c]	0	1.95[b]	1.32[b]	0	0
Oxford	2.29[b]	1.01[d]	0	2.32[b]	.83[e]	.40[f]	.66[g]
Huron	1.69[d]	.99[d]	.75[e]	1.78[b]	1.60[b]	.65[f]	0
Waterloo	2.37[b]	.56[g]	.59[e]	1.89[b]	.93[f]	.47[g]	0.
Wellington	1.16[e]	.61[f]	0	1.52[c]	1.37[d]	0	0
Brant	1.03[e]	.70[f]	-.92[g]	1.04[e]	-1.16[g]	-.68[g]	0
Hamilton-Wentworth*	0	.60[g]	0	1.68[e]	0	0	0
York*	.92[e]	.74[d]	0	1.16[e]	0	0	.77[g]
Peel*	0	0	0	.89[f]	0	0	0
Halton*	1.10[e]	0	0	0	0	-.92[f]	0

[a]Growth rates are derived from computed trend values in 1965 and 1980. The level of significance of the trend coefficient is indicated with each growth rate. The value of the trend coefficient with a significance level of more than 30 percent is considered to be zero; hence, no growth occurred.

[b]Significant at the .01 level by a two-tailed t-test.

[c]Significant at the .02 level by a two-tailed t-test.

[d]Significant at the .05 level by a two-tailed t-test.

[e]Significant at the .10 level by a two-tailed t-test.

[f]Significant at the .20 level by a two-tailed t-test.

[g]Significant at the .30 level by a two-tailed t-test.

*"Urban" counties.
Computed from: Ontario Ministry of Agriculture and Food, Agricultural Statistics for Ontario, annual.

To compute the value of hay and corn silage, the following table is used, indicating the nutritional value of various feeds in pounds per ton and their prices (Ontario Ministry of Agriculture and Food (a) and (c)).

Feed	Dry Matter	Digestible Protein	TDN (energy content)	Average 1976-1980 Price/ton
	-lbs.-	---lbs.---	--lbs.--	----$----
Hay	1,755	146	1,000	44
Corn	1,696	129	1,526	98
Soybean Meal	1,800	788	1,494	259
Corn Silage	779	38	522	16

Since TDN in corn and soybean meal are almost identical, the price difference 259 - 98 = 161 is paid for the difference in digestible protein, being 659 lbs., amounting to $24.43 cents per lb. of digestible protein A value per pound of TDN can be derived by using the nutrient content of soybean meal and multiplying its digestible protein content by the price just derived. The TDN value is .0448 cents per pound. Multiplying these digestible protein and TDN prices by the nutrient content of hay, results in $80 per ton. Hay sells for $44, therefore, it is worth 1.8 times the price for which it is traded. Using the same procedure for corn silage, its nutritional value amounts to $32.67 per ton, twice its price.

To bring all seven crops listed in Table 1 to a common denominator, the trend values of their physical yields in 1965 and 1980 are converted into pounds per acre and multiplied by their respective average 1976-1980 prices per pound. The crops are also multiplied by the percentage that particular crop occupied in 1965 and in 1980 out of the seven crops. Both for 1965 and 1980 these values for the seven crops are added to derive a single index for that year.

A considerable shift in cropping patterns has occurred during this period. Grain corn has increased drastically, while hay, mixed grains and oats have decreased. However, the extent of change and the resulting composition of cropping patterns in the various counties differ. High yielding crops have replaced low yielding crops to a much greater extent in rural than in urban counties. This is not due to the fact that the adoption of a high yielding crop such as corn in rural counties had fallen behind relative to urban counties before 1965. In the rural counties, corn acreage as a percentage of the total for the seven crops increased from 9.1 in 1965 to 35.8 in 1980, an increase of 26.7 percentage points, or 3.93 times. In the urban counties over the same period, the increase

was from 5.6 to 24.8, that is, 19.2 percentage points, or 4.43 times. This shows that the urban counties were behind the rural counties in the percentage of acreage under corn and have slightly caught up with the rural counties proportionally, but not absolutely.

The resulting compound percentage growth rates in land productivity are recorded in Table 2. The first column provides these rates computed from trend values which are significant at the .30 level by a two-tailed t-test, while the rates in the second column are computed from trend values significant at the .10 level. For those crops whose trend values are not statistically significantly different from zero, the average yield over the entire period is used in the computation both for 1965 and for 1980. The second column in the table is statistically more meaningful.

The table shows that urban counties rank low compared with rural counties, with the exception of York. For example, the land productivity increase in Perth is more than three and a half times that in Halton. These higher growth rates in rural counties do not result from catching up with the adoption rate of replacing low yielding by high yielding crops in urban counties. Neither do they result from catching up with higher yield levels in urban counties, as will be shown in the next section.

Brant, as a rural county, ranks low. This could possibly be the result of the crops included in the calculation. Although for all other counties in 1965, 85 to 95 percent of the area in crops (compared with the 1966 Census) is included; for Brant it is only 73 percent. Tobacco is an important crop grown in Brant which is left out in this analysis. The actual increase in land productivity therefore could be higher than the table indicates. Moreover, Brant County is probably to some extent under urban influence. York, as an urban county, compares favourably with Waterloo and Wellington. This might be caused by the fact that York extends to the north to Lake Simcoe. The northern part could be considered completely rural countryside, so that the figure in York is some kind of average between the urban and rural. York has also increased corn acreage to a much greater extent than the other urban counties during this time period.

It should be kept in mind that these growth rates in land productivity are based on physical yields of seven crops and the substitution among these seven crops over time. Special crops such as soybeans, potatoes, tobacco and white beans are excluded. Moreover, pasture land has been excluded as well as the change from unimproved to improved land. These omissions are mainly due to lack of data. Since most of the crop land is included, the figures in the table give a fairly good indication of the increase in crop land productivity.

What is the significance of these differences in growth rates? It does not provide direct information for a comparison of profitability and economic viability of agriculture among counties. To do that, growth rates in productivity of all agricultural resources combined are needed,

Table 2

Annual Compound Percentage Growth Rate of Land Productivity per Acre in Various Counties in Ontario, 1965-1980[a]

County	Trend Value of Physical Yield Significant at .30 Level	Trend Value of Physical Yield Significant at .10 Level
Perth	2.74	2.74
Huron	2.61	2.56
Oxford	2.37	2.20
Waterloo	1.92	1.75
York*	1.86	1.75
Wellington	1.78	1.71
Hamilton-Wentworth*	1.60	1.46
Brant	1.56	1.38
Peel*	1.66	1.15
Halton*	.66	.75

[a]The index contains the following crops: Winter wheat, grain corn, mixed grain, hay, barley, oats and fodder corn.

*Urban counties.

which cannot be obtained by county because the data are not available. The spread in the overall agricultural productivity growth rates among counties may be smaller than those in land productivity. The high growth rates in land productivity in Perth, Huron, and Oxford are probably obtained by substituting capital for land. Nevertheless, such substitution must be profitable, otherwise it would not occur. Thus it is highly likely that growth rates in overall agricultural productivity show a similar ranking among counties. If this is so, the current cost-price squeeze in agriculture must make it increasingly more difficult for agriculture in counties with a low overall productivity increase to survive, unless these low growth rates are compensated for by low land values. There is, however, a limit to compensating retarded growth rates by a reduction in land prices. This, then, raises the serious question about prospective economic viability of agriculture in urban fringe and shadow zones.

The irony is that land values in urban counties far exceed their agricultural use value. On the other hand, much land in these counties is available for rent to farmers. Agricultural land rents here are considerably lower than in the completely rural countryside (Phillips). In certain cases tenants pay no rent at all. Nonfarm landlords qualify both for lower farm assessment of their property if it is farmed, and for a 50 percent rebate in their taxes if they are resident in Ontario and the farm produces a gross value of at least $4,000 per year. These tax advantages, as well as expected inflation of land values, explain why landlords are willing to rent land at a low or zero price (Lerner).

The productivity figures in Table 2 provide other information which is more conclusive. Physical yields in rural counties increase more quickly over time than those in urban counties. The federal and provincial governments are aiming at reducing agricultural imports and increasing agricultural exports. Urban counties do not contribute as much to this goal as rural counties. This begs the question whether a potential source of productivity increase exists that the government could utilize to pursue its objective. This question can only be answered if the cause of the productivity differentials are known and are subject to remedy.

Although comparisons of productivity increases are important, they do not tell the whole story. The same growth rate computed from different base levels results in different yield increases. Therefore, it is also important to know how the yield level in urban counties compares with that in rural counties. Although the choice of counties in this analysis is based on reasonable homogeneity in soils and climate, there are differences, expected to affect yield levels.

To examine the yield level and the various forces affecting it, a multiple regression analysis was performed with corn yields as the dependent variable. The independent variables are the soil quality, proxied as soil classes one and two as a percentage of classes one, two and three in the respective counties, obtained from the Canada Land Inventory (CLI); average corn heat units per county; a dummy for the rural counties;

an overall trend; and a separate trend for Huron, Perth, Oxford and Brant. Three yield observations are obtained per county, namely, the average 1966-69, 1970-73 and 1975-80 yield in bushels per acre. The year 1974 is omitted because of unusual weather conditions, which reduced yield in several counties by around 50 percent. The time period for the trend is considered to be 11 years, because the trend observations are taken at the mid points, namely 67/8, 71/2 and 77/8. A linear equation is fitted to the data by the method of least squares-regression. The results are presented in Table 3.

The regression coefficients all have expected signs. The statistically significant value for the dummy variable in the table shows that yield levels in rural counties are higher than in urban counties, ceteris paribus. Given the same heat units, soil quality and productivity increases, corn yield in rural counties is, on average, five and a half bushels per acre higher than in urban counties. Productivity increases in urban counties are low or nonexistent for corn and related to a low base level. On the other hand, productivity increases in rural counties are high and related to a higher base level on average. If these productivity increases persist over time, it will result in drastic yield differences between urban and rural counties.

Idle Land and Low Intensity Uses

Another striking difference between urban and rural counties is the diversity in agricultural land losses and in the amount of disuse and low intensity use. This statement must be qualified, however. There are obviously areas in the completely rural countryside where the loss of agricultural land has been large. However, it is important to compare losses in areas with more or less similar climate and soils. For the 10 counties examined in this study, the loss of agricultural land between 1961 and 1976 as a percentage of the 1961 agricultural land base was 6.3 percent in the six rural counties, and 21.5 percent in the four urban counties.

The quality of land going out of agriculture into nonurban uses is of prime concern.[3] Efficiency is negatively affected if good agricultural land capable of producing an agricultural land rent reverts to idle land or to lower rent yielding uses.

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[3] Much attention has been paid in the literature to the quantity and quality of land going out of agriculture into urban uses (e.g., Frankena and Scheffman, Russwurm). This problem is not examined in this paper.

Table 3

Regression Results of Corn Yield Determination for Ten Counties

Explanatory Variable	Estimated Coefficient	t-ratio
Soil quality	.117	1.20[a]
Heat units	.011	2.18[b]
Dummy rural counties	5.485	3.38[c]
Overall trend	.403	2.55[c]
Trend for Huron, Perth, Oxford, Brant	.448	1.88[d]
Constant	36.684	

Adjusted R^2 = .729

F value = 16.59

Number of observations = 30

[a]Significant at the .30 level by a two-tailed t-test.

[b]Significant at the .05 level by a two-tailed t-test.

[c]Significant at the .02 level by a two-tailed t-test.

[d]Significant at the .10 level by a two-tailed t-test.

Statistics on the ultimate destination of retrenched farmlands and their quality are virtually nonexistent. Some information can be obtained from case studies. There is, however, much contradiction in the literature about the quality of this land and its ultimate destination. Bryant and Russwurm state that the loss of agricultural land in general is closely related to the uncompetitiveness of that land in agriculture and that much of it becomes abandoned. The authors do not define the term 'abandoned farmland'. It is, therefore, not clear whether they mean idle land or lower intensity uses than agriculture. They state that southwestern Ontario contains very little abandoned farmland, even near Toronto. This would imply that these large losses in the urban counties went into urban use or into forestry or other low intensity uses where the land would be competitive, if abandoned farmland means idle land. It would all have gone into urban uses, if abandoned farmland means idle and low intensity rural uses. Undoubtedly, a large part has been urbanized between 1961 and 1976, but certainly not over 20 percent of the total 1961 agricultural area of these urban counties. This, then, begs the question why so much land in the urban counties becomes marginal in agriculture so that it moves into lower intensity uses or becomes idle, while in rural counties with more or less similar climate and soils, the land is not shifted to lower intensity use, or at any rate not to the same extent.

Frankena and Scheffman provide a useful overview of case studies. These, however, do not show a uniform pattern. Punter, for example, mentions a large increase in the amount of idle land between 1954 and 1971 in the area in York that he investigated. He quotes around 10 percent of the area, and attributes it largely to the low quality of land. Martin, on the other hand, found that the amount of active farmland between 1961 and 1971 decreased only moderately in the urban fringe northeast of Toronto, despite large changes in ownership patterns.

It is impossible to obtain conclusive evidence on the quantity and quality of land going out of agriculture into nonurban uses in the urban fringe and shadow zones. However, the assumption by Bryant, Russwurm and Martin that there is little abandoned farmland around Toronto (if it means lower intensity uses than agriculture) and the claim by Punter that retrenched lands are marginal and would have left agriculture regardless of urban influence, may hold for some small areas in which the case study was done, but are unlikely to hold universally. In any case, an investigation of data released by the Ontario Ministry of Agriculture and Food (b) suggests otherwise.

The Ministry only once released information regarding the amount of assessed agricultural and, what they called "reserve land" by county in 1976. Reserve land is defined as a residential land parcel greater than 25.99 acres or a vacant (without house and/or buildings) land parcel over 10.99 acres, which has not been farmed for more than two years, but is deemed farmable. Although it is not known whether this land is idle or in other rural nonfarm use, such as forestry, it is definitely not in urban use. It should be kept in mind that residential parcels not greater than 25.99 acres are not included. Much land outside these

residences is idle or in low intensity use. The total size of the "reserve land" in Halton, Peel and York in 1976 is almost one-fifth of the 1961 agricultural land base in these counties.

It is interesting to compare the magnitude of the reserve and the factors influencing it between urban and rural counties. The magnitude of reserve land in a county is expected to be affected by soil quality, the higher the quality the smaller the reserve. Moreover, the reserve is expected to increase if more land is retrenched from agriculture. In order to test these hypotheses, a multiple regression analysis was performed with 27 county observations in southern Ontario. All counties below the Precambrian Shield are included as well as three observations in the Ottawa Valley, namely, Ottawa-Carleton, Prescott-Russell and Dundas-Stormont-Glengarry.

The dependent variable is the land reserve in 1976 expressed as a percentage of the 1961 agricultural land base. The independent variables are soil quality, proxied as the total number of acres in soil types one to three of the CLI expressed as a percentage of the total number of acres of types one to six in the county; the 1961-1976 loss of agricultural land expressed as a percentage of the 1961 agricultural land base; a dummy variable for urban counties Halton, Peel, York and Durham; and a dummy variable for the counties Bruce, Grey, Dufferin, Simcoe and Ottawa-Carleton.[4] A linear equation is fitted to the data by the method of least-square regression. The results are recorded in Table 4.

The signs of the regression coefficients are as expected. Nine counties are included in the two sets of dummies. Since the dummy for the urban counties is statistically different from zero, it shows that, ceteris paribus, the land reserve in urban counties is 9.6 percentage points higher than in the 18 remaining counties relative to the 1961 agricultural land bases. Since the land reserve is higher in the urban counties than in the 18 other counties, given similar soil quality in these two sets of counties, there is a high probability that the reserve in urban counties contains higher quality soils than in the 18 other counties, although no such evidence can be obtained from the regression analysis.

The four Georgian Bay counties and Ottawa-Carleton show an even higher reserve than the urban counties, ceteris paribus. There is undoubtedly much urban influence from the Toronto area in these Georgian Bay counties and apparently of a highly extensive land use nature.

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[4] Hamilton-Wentworth is an exception with respect to the proportion of reserve land in urban counties. Its proportion conforms more closely to that of rural counties with similar soil quality and agricultural land loss. While the reasons for this are not clear, it has been excluded from the dummy for the urban counties and left with the remaining counties which give rise to the constant term.

Table 4

Regression Results of Land Reserve Determination

Explanatory Variable	Estimated Coefficient	t-ratio
Soil quality	-.205	2.12[a]
Agricultural land loss	.329	1.96[b]
Dummy urban counties	9.680	3.20[c]
Dummy for Bruce, Grey, Dufferin Simcoe, and Carleton	23.675	9.12[d]
Constant	18.971	

Adjusted R^2 = .872

F value = 45.36

Number of observations = 27

[a]Significant at the .05 level by a two-tailed t-test.

[b]Significant at the .10 level by a two-tailed t-test.

[c]Significant at the .01 level by a two-tailed t-test.

[d]Significant at the .001 level by a two-tailed t-test.

According to Table 4, a one percentage point loss in agricultural land results in a one-third percentage point increase in the land reserve among counties. Since agricultural land losses in the urban counties are almost three and a half times higher than in the rural counties examined previously, the land reserve in the former counties is therefore also higher on this score. If this relationship between agricultural land losses and size of the reserve among counties holds also within a county, then one-third of the roughly 21 percent loss in agricultural land between 1961 and 1977 in the urban counties has been shifted into the reserve.

It has been shown in the previous and in this section that urban counties compare unfavourably with rural counties in physical yield levels (at least for corn), in land productivity growth over time, and in the amount of land held in reserve (either idle or low intensity uses) which is probably of a higher quality than in rural counties. All this seems to indicate that land in urban counties not shifted to urban uses performs below its potential. National economic efficiency is affected if these lands are producing below their economic potential. The next question that needs to be briefly examined is why these differences between urban and rural counties exist.

Causes of Agricultural Differences Between Urban and Rural Counties

Urban invasion is often cited as the cause of a host of problems in the urban fringe and shadow zones. What this invasion is exactly and how it relates to the problems in the fringe and shadow zones usually remains vague in literature. Land speculation is the most frequently cited phenomenon.

For our inquiry, it is helpful to look at some basic characteristics of farmers and of tenure patterns in both urban and rural counties. Table 5 provides information for 1976 on these characteristics for three urban counties of Halton, Peel and York, for southern Ontario south of the Precambrian Shield, and for a county with a completely rural countryside, Huron. Comparisons reveal that there is striking difference in tenure patterns. Differences in age distribution of farm operators and in the length of time that part-time farmers work off the farm are also noticeable.

The high level of rented land in urban counties results from widespread nonfarm ownership of farmland there. The higher level of off-farm employment is probably related to a greater choice and availability of off-farm jobs in the nearby city. It is not clear why there is an older age distribution of farm operators in the urban areas compared to the rural areas. It may be the result of difficulty in entering farming on an ownership basis due to high land values. In any case, these characteristics seem to be related to urban influence since they occur to a greater extent in urban than in rural areas.

Table 5

Tenure Patterns and Characteristics of Farmers in Southwestern Ontario, 1976

	Halton, Peel, York	Southwestern Ontario[a]	Huron
Percent of operators as:			
owners	53.3	65.7	70.7
part owners - part tenants	31.1	28.0	25.9
tenants	15.6	6.3	3.4
Percent of farm area operated by:			
owners	27.5	48.7	56.7
part owners - part tenants	52.1	45.8	40.9
tenants	20.5	5.5	2.3
Percent of total farm area:			
owned by operator	49.9	75.3	83.1
rented by operator	50.1	24.7	16.9
Percent of farm operators reporting off-farm employment:			
less than 229 days per year	80.8	83.5	89.0
229 or more days per year	19.2	16.5	11.0
Percent of farm operators:			
below 55 years of age	64.9	68.2	71.7
55 years of age or more	35.1	31.8	28.3

[a]Southwestern Ontario south of the Cambrian Shield, excluding Halton, Peel, York and Huron.

Source: Census of Canada, Agriculture Ontario, 1976.

Could these differences explain the variation in land productivity and possibly the large land reserve existing in urban counties? Security of tenure is highly affected since most rent contracts are on an annual basis and restitution clauses for long-term investment are exceptional or nonexistent. A study of the urban shadow in Halton by Phillips shows that investments in land improvement are hardly undertaken on rented land, while they are carried out on owned land. Research currently ongoing at the University of Guelph on farm tenure in the agricultural heartland of Ontario points to the same results. Tile drainage especially is a crucial investment in boosting productivity. We find that there is considerably less tile drainage on rented than on owned land. We also find that the existence of tile drainage advances the planting date for corn and consequently raises the yield level.

The growth differences in land productivity among counties are expected to be highly affected by differences in farm tenure patterns. To test this hypothesis, the amount of rented land per county as a percentage of the total farmland area was regressed on the annual compound percentage growth rate of land productivity (column 2 of Table 2). The hypothesis is that the level of farm tenancy rather than the change in farm tenancy affects productivity growth; the higher the tenancy, the lower the growth rate. The latest tenure information is in the 1976 Census and is used in this analysis. Although the counties are divided into urban and rural, the latter do not display a uniform tenure pattern. Dependency on rented land is lowest in the purely rural counties of Huron, Perth and Oxford, while Brant, Waterloo and Wellington show greater dependency on rented land, but less than in urban counties.

York county shows a much greater land productivity growth rate than the other urban counties, therefore, a dummy variable is included for York. A linear equation is fitted to the data by the method of least-square regression. The results are shown in Table 6.

The tenancy variable has the expected sign and is statistically highly significant. York county, on the other hand, does not conform to this general pattern. Its productivity growth, relative to the area rented, is much higher than in other counties. The reason is not clear. At any rate, the hypothesis that tenure patterns are an important variable in determining land productivity growth is not rejected.

Phillips also found crop yield variations among different age groups, and between farmers working 229 days or more and those having less than 229 working days off the farm. Operators who indicated less than 229 days of off-farm employment produced the higher average crop yield in five of seven crops. However, because of the need for standardizing the groups to be compared, some sample sizes became so small that, for many crops, yield differences among age groups and among off-farm work categories were not statistically significant.

Table 6

Regression Results of the Determination
of the Compound Annual Percentage Growth Rates in Land Productivity

Explanatory Variable	Estimated Coefficient	t-ratio
Percent of area rented	-.0427	5.96[a]
Dummy York County	.8649	2.60[b]
Constant	3.0216	

Adjusted R^2 = .788

F value = 17.73

Number of observations = 10

[a]Significant at the .001 level by a two-tailed t-test.

[b]Significant at the .05 level by a two-tailed t-test.

There is no doubt that problems such as vandalism and theft in the urban-rural fringe exert a negative influence on agricultural productivity. These effects certainly influence the yield averages in the urban counties, but since statistical information on these forces is not available, their extent and magnitude are difficult to ascertain.

The large reserve in urban counties relative to its 1961 farm base is probably also closely related to a high degree of nonfarm ownership of land in these areas, although there is no statistical proof for this proposition.

Conclusion

Agricultural land use in areas affected by urban influence compares unfavourably with that in the completely rural countryside. Moreover, much land in the former areas seems to be in lower intensity uses than agriculture compared with the rural countryside.

Under-utilization of land in the urban shadow zone should be of prime concern for planners and policy makers rather than in the urban-rural fringe, because the former zone is much larger and will likely never be used for urban development. Moreover, land in the urban shadow in Ontario and usually elsewhere too, is prime with respect to soil fertility, topography, climate and particularly with respect to location. This does not imply that the urban fringe should be ignored. However, agriculture in the urban-rural fringe is of necessity restricted. The planning issues for the fringe have been discussed elsewhere (Rodd and van Vuuren).

It is not the intent of this paper to propose policy solutions. Sound planning and longer-term leases are often advocated. The prevailing urban climate is characterized by a distinct socio-economic and institutional environment. What sound planning in this environment involves and how it is implemented are not usually spelled out. The planning and policy issues are extremely complicated. Longer-term leases are not the sole solution to this problem either since uncertainty in these areas does not derive exclusively from tenure. Moreover, security of tenure does not necessarily lead to land improvement. Many decisions require the consent of the landlord or must be initiated by him. Absentee landowners may be difficult to approach or may have little interest in upgrading agriculture around urban centres.

Rural planning has been too preoccupied with agricultural land losses to urban uses. Under-utilization of land not being urbanized and the danger of impairment of long-term viability of agriculture in the urban shadow zone appear to be serious problems. They run counter to the policy objectives enunciated by both the federal and provincial governments, to increase exports and reduce imports of agricultural products. Planning and policy making have paid hardly any attention to inefficient rural land use in the shadow zone. Admittedly, this is partly due to a paucity of good statistics.

There is also too much complacency about the reserve land. The mere physical availability of the reserve does not necessarily imply that that land will shift back to agriculture when it is needed in the future. The cost of such reversibility in the future may be high. Institutional constraints may also inhibit future reversibility. Policy formulation and analysis for the land use problems in the areas surrounding our large cities appear to be badly needed but have hardly been initiated.

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DISCUSSION: ECONOMICS OF LAND USE ISSUES

Terrence S. Veeman*

Land use issues are an increasingly important policy concern in Canada. Conflicts over rural land allocation have become more frequent and intense as various uses of rural land have become more and more competitive. Many agrologists and environmentalists contend that prime agricultural land must be preserved. In the assessment of such land use policy matters, an economic perspective is imperative and yet has been lacking in much public discussion. Resource economists face a major challenge in trying to analyze land use issues in economic terms and in attempting to influence land use policy.

The papers under discussion illustrate economic approaches to three interesting sub-themes in the overall land use domain. The paper by Cuthbert, Barichello, and MacMillan outlines the analytical and empirical approach an economist would take in assessing which of two mutually exclusive competitive uses of a parcel of land in south-eastern British Columbia should be undertaken by a private resource user. The paper by Prevost and Kraft is of interest in that it applies preservation/development choice logic, following John Krutilla, to the question of whether rural land near Winnipeg should be preserved for farming or developed for rural residences. The paper by van Vuuren focuses on the adverse effects of urban influence on agricultural land use around urban centres and represents a detailed empirical attempt to measure the reduction in land productivity in counties close to Toronto in southern Ontario. Above all, the three papers illustrate how much of our empirical work and policy conclusions on land use matters must be on an individual case study and location specific basis.

Cuthbert et al., assess the private economics of two competing potential uses (forestry and grazing) of a tract of clear-cut Crown land in the East Kootenay region of British Columbia. Conceptually, the analysis involves the seemingly straightforward comparison of the discounted net (private) benefits of the two respective uses. In each case, the benefit stream can be evaluated in terms of market prices. As it turns out, both uses generate negative net private benefits (with forestry being the relatively more attractive option of the two). On efficiency ground, then, the private management decision should be that no use of the land should be undertaken, though the notion that nonuse of a resource may be the best use is an idea that dies hard among some noneconomists.

The analysis of the forestry and grazing uses, of course, may rest on sensitive assumptions. The forecasts of future prices and yields seem plausible and are based on relatively sophisticated techniques. However,

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the negative discounted net cash flow associated with forestry results in great part from the assumed expenses for silviculture. The question to be asked (and it was by audience participants in the overall discussion of the paper) is whether the forestry use could be based on methods of natural revegetation, enhanced by much more modest silvicultural expenditures. Similarly, the assessment of grazing is conditioned by initial pasture development expenses and the budgeted figures for ranch investment in buildings and equipment. The general result for grazing development in the East Kootenays (that is, that projected costs outweigh potential benefits) is in line, however, with earlier studies of pasture development and grazing in that region.

Many further issues arise if the assessment of alternative land uses is done from the social perspective, as usually must be the case in most policy instances. The analyst must be concerned not only with private returns and costs, but also with unappropriated (external) benefits and uncompensated (external) costs which are never easy to estimate empirically. Prices which are supported must be adjusted downward to efficiency levels--which, in the grazing example, means excluding farm income assurance payments for beef from the social benefit stream. The issue of secondary benefits inevitably arises, though secondary benefits should only be included if the analyst suspects persistent unemployment of resources in future years. And, finally, the analyst must choose an appropriate social rate of discount which reflects not only the opportunity cost of capital, but also consideration of social time preference. In short, the public economics of evaluating alternative land uses is even more difficult than evaluation in private terms.

Prevost's model is better regarded as an opportunity cost or alternative site selection model than as an option demand model. Her work, however, represents one of the first empirical attempts in Canada of which I am aware, to assess the relative benefits and costs of two alternative uses of land (farming or rural residential development) on two alternative parcels of land in the urban fringe. The parcels vary in agricultural productivity and are located at different commuting distances from the urban centre--in this case, Winnipeg. The analysis adapts the preservation/development choice logic pioneered by Krutilla in his classic study of whether the Hell's Gate Canyon of the Snake River in Idaho should be dammed and developed for hydro-electric power or preserved for wild river benefits. Whether the higher quality agricultural parcel which is closer to the city should be preserved for farming depends on such factors as the relative productivity of the two parcels, the relative commuting distances (and associated costs) which are involved with the two sites, and the size of lot into which the parcel is to be subdivided. Clearly, we need much more work on the benefits and costs of agricultural land preservation in which alternative uses, opportunity costs, and tradeoffs are clearly outlined. Further variables which might be worked into the analysis include more detailed cost estimates of site development and the relative recreation and aesthetic benefits of alternative sites.

The foregoing site selection model, however, cannot readily cope with the wider question of whether both parcels of land should be preserved for agricultural purposes or whether both parcels should be subdivided for rural residences. Nor does it seem to me that the model contains an explicit option demand component. The benefits of the preservation alternative appear to be couched in terms of differential yields on the two parcels and include no consideration of the possible societal willingness to pay to retain the option to farm the land in the future. However, whether the public should have a considerable option demand with respect to agricultural land preservation is a debatable proposition. Option demand is a relevant consideration where no close substitutes exist for the unique resource in question. Where prime farm land is concerned, it can be argued that there may be substitutes for the raw land base insofar as the twin forces of capital investment and technological advance stretch the productive capacity of agricultural land.

Van Vuuren analyzes the adverse impact of urban influence on agricultural land use on lands in the rural-urban fringe and urban shadow zone surrounding Toronto. His empirical work indicates that "urban" counties near Toronto have lower corn yield levels than rural counties, lower land productivity growth rates (after careful adjustment for changing crop mix), and more land in reserve which appears to either idle or in low intensity uses. His analysis covers major crop uses, but does not include specialty crops and possible land-intensive agricultural operations like market gardening and nurseries which tend to locate near cities. A further complication in assessing whether rural land is being used inefficiently near cities is that the use mix on such land is not solely agricultural, but may also include urban-related recreation, housing, and other uses.

I agree with van Vuuren that we have been too preoccupied with the question of agricultural land losses in the urban fringe and that too little attention has been paid to trying to improve the under-utilization of rural land in the urban shadow zone. As he suggests, we need more study of alternative leasing, tax, and institutional arrangements for such lands under urban influence. The unease I have with van Vuuren's position is that he seems to imply that inefficient use of rural lands around cities may be considerably impairing overall national economic efficiency in the agricultural sector. I personally feel this is a minor, rather than a major, issue. To argue that agricultural land use around urban centres is highly influenced by urban pressures does not support the proposition that agricultural land use in general in Canada is highly influenced by urban pressures. Canadian agricultural production potential and future productivity performance, in my judgment, rests far more heavily on the policy measures we take to avoid the apparent qualitative degradation of the agricultural land base in Canada and on the societal investments we make to enhance productivity on the existing land base.

Let me conclude with some general comments on the agricultural land base and land use policy in Canada. It is commonly argued that the quantity and quality of the agricultural land base in Canada are diminishing. It is true that agricultural land in parts of Canada, particularly on the prairies, has been undergoing qualitative deterioration involving loss of natural fertility. But I do not accept the contention that the agricultural land base is declining in quantitative terms. Preliminary results from the 1981 Census indicate that while the total area in farms in Canada has decreased some three million acres since 1976, the area of improved farm land (really the best barometer of the agricultural land base) has increased nearly six million acres since 1976.

My final concern relates to the role of economists in land use research and policy formation, particularly at the federal level. I am disturbed that there are so few resource economists in the federal civil service who are dealing with agricultural land and water use issues--a situation quite unlike that in the United States. In Canada, land use analysis and policy formation at the federal level has largely been in the hands of our colleagues in soil science and geography. I would hope that the federal government would hire more resource economists and that an economic perspective would be increasingly seen in land use analysis and policy.

DISCUSSION: ECONOMICS OF LAND USE ISSUES

W. Robert Wilson*

The opening paper in this session was intended to provide an introduction to the economics of provincial agricultural land policy. It is unfortunate that his paper is not available because it likely would have raised some of the critical economic issues involving land use, issues such as institutional influence, the area of market failure, and the equity and incidence of the costs and benefits of land use. However, in the absence of this foundation we have heard presentations of interesting studies, studies which, although applied research efforts, have partially ameliorated the overview deficiency.

Van Vuuren asserts that public sector decision making historically has been preoccupied with the direct loss of agricultural acreage to urban use, but that the deleterious effect of urban influence prior to the actual loss (i.e., reduced productive efficiency of and low-intensity use of agricultural land spatially located within an urban region) is likely to be more pronounced in the aggregate. His study is an extension of earlier work by Rodd and van Vuuren claiming that rural nonfarm residential growth was one of the major factors affecting the retirement of agricultural land in Ontario. The authors also claimed that the vast majority of the displaced acreages were not submarginally productive and

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The author benefited from discussions with L. Arthur and C. Van Kooten.

were not used for city expansion. However, Frankena and Scheffman subsequently noted that Rodd and van Vuuren had not provided any empirical evidence to support the posited inverse relationship between agricultural acreages and rural residential dwellings.

In an interesting paper, van Vuuren develops a quantitative comparison between certain aspects (e.g., productivity and usage) of agricultural land in the urban-fringe/shadow zone and in the urban zone. This comparison is effected by utilizing an aggregation of five urban and six nonurban counties as delineated proxies. The analysis revealed that growth in land productivity in rural counties outstripped that in urban counties; the adoption of high yielding crops was much greater in rural counties. The analysis is strictly in volume terms and might mask some shifting into higher valued specialty crops in the urban counties in accordance with Von Theunen's location theory; the study explicitly excluded specialty crops. The computation of the yield and productivity trend variables is peculiar or perhaps incorrectly described, calculation of the change in land productivity is influenced in an unpredictable fashion by changes in the acreage sample across time, and price differences among crops will be a function of relative availability (e.g., the recent barley price premium to the corn competitive price), inter alia. Further, the study explicitly assumes that soil quality is homogeneous across counties, but proceeds to include soil quality as an explanatory variable in combined cross-sectional and time-series regression.

Several questions remain unanswered in the paper. Is there evidence to support the statement "...high growth rates in land productivity in Perth, Huron and Oxford are probably obtained by substituting capital for land?" How is the displaced factor, land, used? Could the displaced land (i.e., land removed from the sample) bias any acreage-based productivity measure for the remaining land?

Urban county land prices exceed their agricultural use value because future urban-use rents are expected to be greater than future agricultural rents. If the discounted future rent stream is expected to be positive, the land resource will command a positive price in the market and although it may be kept idle (current rent is zero), it will not be abandoned. Van Vuuren may be incorrect in ascribing low land rental rates to prevailing tax advantages and expected capital gains. Neither of these factors should induce the denial of an ability to capture available resource rental revenues. Perhaps the observable low rental values are the product of the quality of the land rented; Ricardian rents are low because of the relatively low land productivity, parcel size, or location (c.f., Punter, Martin, Frankena and Scheffman). The equity considerations of the taxation situation, the subsequent subsidy, and the effects of the subsidy merit study.

Van Vuuren's focus on indirect rather than direct losses appears to be appropriate (c.f., Frankena and Scheffman), but a multiple-use valuation of urban lands might prove useful for future comparisons. Urban

county land values will be directly related to the discounted value of all anticipated future activities.

Finally, the problems of reduced productivity and low-intensity land use do not appear to be endemic to the national rural/urban interface. In some areas in the western provinces the loss of agricultural land is a concern (e.g., Manitoba has lost more than 750 thousand acres to urban development, the bulk of which was class 1 and 2 in the Red River Valley), but the indirect production losses are much less a problem.

Prevost and Kraft develop a combination benefit/cost and regional planning model to examine the alternatives of maintained agricultural land-use versus rural residential development for a Winnipeg-based labor force. The model is not a Krutilla-type option-demand model, but it defines option demand as the opportunity cost of residential use value net of the agricultural use value; if the land is maintained in agricultural use then the option for residential use is retained.

As in the van Vuuren paper, Prevost and Kraft note the indirect agricultural losses associated with rural residential development (e.g., planting constraints imposed by undefined property boundaries) and the foregone production preceeding subdivision construction. A distinction between these losses is necessary, however, because in the case of the latter loss the value is included within the purchase price of the land; in an attempt to minimize transactions costs a rational developer would consider the opportunity cost of foregone resource rents, and an election to leave the land idle suggests that benefits of doing so outweigh the costs (a situation in which private and social net benefits may differ).

The decision to increase lot size when the site with shorter commuting distance (i.e., the lower total development costs) has the greater agricultural productivity is based on the regional planner's judgment that the site with the higher quality soil has the better preservation option. Increasing lot size from one to seven acres reduces the residential carrying capacity of the entire site, raises average cost per residential unit, thereby affecting marketability and may create pressures for development of additional sites.

In one test of the model's sensitivity it was concluded that changing commuting distance does not affect the preservation/development results. However, because the commuting distances were changed by an equal amount for each site, a change in the results was unlikely. The authors also provided an examination of the impact of varying commuting distance from one site (the site with the lower quality soil) and of varying soil quality. An interesting conclusion is that the greater the soil quality difference between sites, the greater the probability that the higher quality site will be preserved.

Finally, Cuthbert, Barichello and MacMillan provide a short (indeed perhaps too short) overview of their work in measuring the net present value (NPV) of the private return for two alternative resource utilization options; the forestry and grazing options considered in the study are treated as mutually exclusive demands. Box-Jenkins techniques are employed to construct real indexes for prices and costs. However, the real logging and milling costs generated with this statistical approach are rejected and replaced with an assumption of no change, because, it is argued, the increase in logging costs reflected in the Box-Jenkins estimate represents the increased cost associated with harvesting at the extensive margin and the present analysis deals with a single site. It is not clear, however, that the movement to the extensive margin is the only factor affecting the measured cost increase; over the same period these increased costs may have been at least partially offset by technological change and some of the remaining cost increase may have been in response to environmental regulations imposed by the public sector (which would affect even the single-site rotation model).

Both forestry and grazing options begin with an assumed clear-cut of the extant timber stand but the harvest-generated product value is not included in the NPV calculations. To whom did the rent from the original cut accrue? The point of accrual has implications on the incidence (and equity) of the calculated benefits and costs. Further, variation among the time periods used to estimate price and cost indexes could introduce some bias. Why not employ a consistent time period?

Given that the calculated negative NPV's reflect the actual situation, policy implications warrant additional consideration. What do the study results suggest is the impact on land usage; is the outcome one of nonreforestation? Based on the estimates, it appears that the forestry NPV would be positive in the absence of reforestation costs. If reforestation costs are so critical to viability, will the lumber companies reforest and if they elect not to reforest, should they be permitted to continue to harvest? Should the public sector fund reforestation costs and thereby subsidize lumber product prices? If harvesting and reforestation occur, are harvesters irrational or are they driven by other forces for which the model has not accounted? The most critical questions remain unanswered.

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THE IMPACT OF GOVERNMENT POLICIES AND DECISIONS ON MANAGING THE FARM BUSINESS*

Chairman: Bruce Hackett**

CHANGING GOVERNMENT POLICY: HOW TO PLAN FOR AND COPE WITH CHANGE AND INCORPORATE IT INTO BUSINESS DECISIONS

W.G. Stewart***

I would like to make one point perfectly clear at the outset. I am a realist. Government policies may be frustrating, counterproductive or contradictory in many cases. As long as there are governments, however, we will have government involvement in agriculture. There are various reasons, but two will suffice. Most people see the production of food a basic necessity, as one where government has every right to interfere to ensure continued supply at the cheapest possible price. Secondly, agriculture depends on land. With only a finite amount of arable land and a steadily increasing population, competition for the land among various users intensifies. The result: an expanding government role as arbiter of land use decisions.

So government is here to stay. The challenge then, for both government representatives and producers, is to improve the process of constructive dialogue. The impact on the farm community of changing government policy must be fully understood by both sides before policies are implemented.

At present, we are nowhere close to the point where agricultural policy is based primarily on the needs of the industry. The problem, I suppose, is that the tenure of most governments is too short or uncertain, and the farm vote too insignificant, for there to be comprehensive long-term strategies drawn up. Governments, in developing their agricultural policies, do not act--they react--usually with short term solutions (or band-aids). This results in considerable uncertainty for agricultural producers. That's what we need in agriculture today--more uncertainty!

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*A presentation by R. Stewardson (Toronto-Dominion Bank) entitled HOW DOES GOVERNMENT POLICY AFFECT LENDING INSTITUTIONS AND WHAT IMPACT DOES THIS HAVE ON FARM LENDING was not made available for these Proceedings.

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Just how involved is today's agricultural producer with government? This depressing diagram (Figure 1) shows a number of ministries and crown corporations we deal with at our operations along with some of their programs. The list is by no means comprehensive.

You may think some of these bodies have little bearing on a farmer, in the sense that the costs in terms of time and dollars are low. You would be surprised. Take, for example, the Motor Vehicle Branch. Our feedlot is operated as a joint venture between two companies, doing business with virtually everyone under the name of Border Feedlot. Not, however, with the Motor Vehicle Branch! They say our vehicles have to be registered in the name of "Highland Valley Cattle Company Ltd. and Baird Cattle Co. Ltd., doing business as Border Feedlot." There's just one problem; that does not fit into their computer. We have had to go to the trouble and expense of forming a separate corporation for the sole purpose of registering our trucks!

Let's run through this list. There are some programs here which have been of significant benefit to producers, such as:

ALDA - Low interest rate loans for agricultural land development.

ARDA - Joint federal-provincial program which has helped pay for very significant long-term improvements to Crown range in B.C., changes that would not otherwise occur, due to tenure limitations, in addition to many other projects.

BCMF - The Ministry supervises grazing use of Crown range. In our case, it appears that the goal of the BCMF Range Agrologists is to maximize grazing productivity over the long term; this is in harmony with our objectives, of course. As we have seen in the past, a change in government can upset the entire grazing tenure system.

Health of Animals - With the exception of ARDA and CNLSR, this is the only federal organization on the list about which I have anything positive to say. Although occasionally unpopular with individual producers (for obvious reasons), the fact that Canadian beef and pork can be exported all over the world reflects well on Health of Animals.

Farm Income Insurance - I am only familiar with the beef part of this program. Its main fault is that it is so complex that very few producers have taken the time to understand it. Because it was so difficult to predict the long-term consequences, producers decided whether or not to sign up based on the perceived benefit in year one. The second problem is that government initiates changes to the program every single year, in order to fine-tune the models or make things more "fair." I contend that the costs of creating, administering and fine-tuning this complex program are far greater than the potential costs of abuses under a simpler one.

B.C. MINISTRY OF AGRICULTURE & FOOD

- ALDA
- ARDA
- Brand Inspection
- Farm Income Insurance
- Interest Reimbursement
- Veterinary Branch

B.C. MINISTRY OF ENVIRONMENT

- Water Branch
- Pollution Control

B.C. MINISTRY OF FORESTS

Crown Range Use
- Annual Permit
- 10 Year Licence
- 21 Year Lease

Others Users
- Logging, Recreation

B.C. MINISTRY OF LABOUR

- Workers' Compensation
- Youth Employment

B.C. MINISTRY OF LANDS, PARKS & HOUSING

- Alienation of Crown Land
- 21 Year Grazing Leases

B.C. MINISTRY OF TRANSPORT AND HIGHWAYS

- Motor Vehicle Branch
- Highway Fencing
- Expropriation ("Resuming")

LAND REGISTRY OFFICE

B.C. ASSESSMENT AUTHORITY

B.C. HYDRO

- Power Lines
- Thermal Coal Plant (Hat Creek)
- Rural Electrification

FEDERAL GOVERNMENT, ETC.

- ARDA
- CNLSR
- CWB
- GATT
- Health of Animals
- Interest Rate Policy
- Metrification
- National Energy Program
- ROP
- Revenue Canada

Figure 1

Veterinary Branch - They may not be to blame, but someone in government decided last year that growth implants for cattle could only be sold to producers by veterinarians. This increased our cost of implants by 50 - 80 percent in return for which we got no additional benefits.

Water Branch - Our water licence fees increased 100 percent this year, resulting in a double-barreled increase--first to our own fees, second to our Hydro bills, because hydroelectric power is the main source of electricity in B.C.

Ministry of Labour - Workers' Compensation coverage becomes compulsory for all farm workers in B.C. next year, automatically increasing the labour bill by 4 - 6 percent. In addition, the question of arbitrary safety standards for farm equipment could become extremely costly--to my knowledge, there was virtually no consultation with the agricultural producers before this was announced.

I could go on, but if I get started on interest rates, the national energy program, or metrification (who is going to buy beef for "$8.00 per kilogram" in this economy?) we'll be here all day. One final note: I hope some day to deal with the Revenue Canada people on the matter of income tax, but I understand the ranch has to own something called a "profit" before that happens.

Before I talk about coping with changing policies, I would like to summarize briefly what's wrong with government policy in agriculture today.

1. There is too much of it. Six one-syllable words--surely those in government will get this message one day.

2. Government policy more often than not adds to uncertainty in agriculture. Policies are developed in a vacuum, without sufficient consultation with those most affected. Once they are in place there seems to be an irresistable urge to tinker with them constantly.

3. Government programs can encourage expansion within the industry at ill-advised times, or can encourage introduction of people into the industry at inappropriate levels. I am thinking here of the original swine Farm Income Insurance program in B.C., through which some new producers got their first real exposure to the hog industry in 100 sow farrow-to-finish operations.

4. Paper, paper, paper! What's wrong with a simple program? Why is it that complicated programs, often based on complex models and encompassing pages of regulations, seem to be the rule?

5. My own opinion is that all too often policies are developed by people out of touch with the real situation. If I had my way, virtually no one would go to work for government directly out of university. There

are, of course, exceptions, but the long-term effects of individuals moving from one sheltered existence to another show up in policies that fail to solve the problems they are intended to address.

How do producers cope with changing government policy? I believe many producers just assume that what is here today will be here forever. What else can they do when the nature of the inevitable changes is almost impossible to predict? There are many examples and I saw a very clear one in my time as a bank agrologist.

In B.C., the government provides partial interest reimbursement to qualifying farmers, in reference to interest paid to banks and similar lenders. When the program first came out, the net rate paid by farmers was set at 8 percent. For the first few years, however, the program was effectively annual. Producers could not be sure from one year to the next whether the reimbursement would be there, or at what rate. Nevertheless, cash flow projections in support of long-term loans continually came in, showing 8 percent interest for the full term of the loan. In many cases, net cash flow was only marginally positive, but these people honestly believed their projections were valid. They refused to consider the impact of higher rates. Some got their financing one way or another. Where are they now, I wonder.

While I'm speaking about the interest rebate program, I must point out that it is one case of an apparent attempt to add stability to producers' costs, where the end result was just the opposite. As I said earlier, the rate was subject to annual adjustment and set initially at 8 percent. After two or three years, it was increased to 9 percent. Subsequently, it was altered to 2 percent below average prime. Currently, it is at 1 percent below prime. You see, the government budgeters could not cope with the uncertainty of a fixed net rate in the face of fluctuating bank rates. Therefore, they moved the uncertainty back to the producers.

Another way producers cope is to ignore government policy when making their business plans. Actually, this is almost the same as assuming that what is here now will stay forever; the only change incorporated into the plan is that existing programs may disappear. Unfortunately, either approach is dangerous because policy changes so often have negative effects. There is a saying, a little unfair to be sure, that incorporating government involvement into a business decision will double the time and halve the return. While overstated, the principle is sound. The producer who planned an intensive livestock facility in the last few years without incorporating the impact of increased environmental controls knows this all too well.

Fortunately, many programs are still voluntary, and producers philosophically opposed to them have the option of passing. In these days of high interest rates, and increasing pressure to reduce per-unit production costs, however, the luxury of this option is frequently open only to the long-established successful operator.

I have only three recommendations on coping with changing government policy:

1. Be informed! I spoke of the failure of government to listen to producers, but communication is a two-way responsibility. Producers have to develop their contacts within government, both individually and through their associations. Only this way will they get maximum warning of, and influence on, the options being considered.

The second aspect of being informed results from the complexity of many programs. You have to evaluate the implications of each policy change, for both the individual and the industry, before signing up or passing on what are often long-term commitments. Following your neighbour's lead will only be successful if he has done the evaluation, and even then what is right for his operation may be wrong for yours.

2. Be quick! New programs have an alarming tendency to be here today, gone tomorrow (or at least here today, watered down tomorrow). Government funds allocated to new programs are frequently insufficient to meet the demand, and "first come, first served" becomes the rule. Producers who wait for programs to get "better" are often disappointed. These two points go together, because the better informed you are before the fact, the shorter the time necessary to decide whether or not the program will benefit you.

3. Be flexible! With all the uncertainties in markets and costs, producers don't need to be reminded of the need for flexibility. However, the additional uncertainty resulting from government policy can easily be overlooked when formulating business plans.

I do have a few recommendations for government policy makers, most of which will be apparent from what I have already told you.

1. Listen to producer groups. They should know as much about what is good for their industry as you do. For example, I urge Mr. Whelan to listen carefully to beef producers rejecting supply management.

2. Do not act just for the sake of being seen to be acting.

3. Senior policy makers should keep their own contacts open to the industry. If they rely solely on their subordinates for information--subordinates whose major motivation in these times may be to justify continued employment--inappropriate decisions may be made.

4. Once a program is in place, give it a chance. If you have done the consultative work beforehand, there will be less likelihood of any need for frequent changes.

5. When you are setting up a program, give some thought to measuring its effectiveness at a later time. How "success" will be measured should be discussed with producers. If this were done, it would be much easier to justify elimination of programs that are no longer doing the job they were intended to do.

In closing, I would like to share with you my most recent contact with government. The Ministry of Lands, Parks and Housing oversees the process of allocation of Crown land in B.C. Periodically, individuals apply to lease or purchase small parts of our Crown range for homesites or other uses. Presently, the Ministry is considering an application to establish a rifle range in the middle of our summer range. I have been asked my opinion...

UNANTICIPATED EFFECTS OF REGULATION ON AGRICULTURAL MANAGERS AND MARKET PERFORMANCE

Larry J. Martin*

Canada has in place today a series of policies which either directly or indirectly impinge upon the decisions of agricultural managers--at all levels of the market--and, therefore, on agricultural market performance. It is my observation that these policies, and particularly changes in the instruments which are used to effect policy objectives, can and do lurch through the system from one level of managerial decision to the next, to cause at worst negative effects on performance and, at best, uncertainty.

In what follows, several examples of changes in macro-economic, stabilization and supply-management policies are addressed, some of their implications to management decisions are traced and their potential impacts on performance are discussed.

Macro-economic Policy

Recently we have been working through a number of cattle feeding budgets for the various provinces over the past three years. I now understand better why my friends in the cattle business have been so upset about interest rates. An increase in rates from 15 to 20 percent while feeder calves are in inventory does interesting things to a cost statement and cash flow requirements. For example, using 450 lb. steer calves at $1.05/lb., feed costs at $200 per head and adding $65/head for other cash costs and then calculating interest first at 15 percent and then at 20 percent on the calf and on half the feed and other cash costs, the last 5 percent adds $26.08 per head to the cost of finishing. Increases in interest rates of this magnitude and more occurred for some producers in 1980 and 1981--soon after cattle were placed on feed. When multiplied over 1,000 head or more, one can begin to appreciate the effects on cash flow requirements.

Simultaneously, these interest rates impacted on the discretionary incomes of consumers. This and other factors have clearly had a negative effect on demand for beef, resulting in less cash flow, precisely when it was most needed. The past two years of interest rate policy has clearly made cattle feeding, particularly feeding calves, the riskiest enterprise in agriculture and has changed some management decisions: some producers have stopped producing; others have gone to short keeps; all feedlot operators have paid less for feeders.

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However, the effects don't stop here. In Ontario our cattlemen tend to feed a high forage type of ration. The result is rather economical feed (compared to the high grain rations of the West), but lower daily gain. Lower daily gain means it takes longer to put a given amount of gain on cattle and that increases the interest cost of carrying the cattle, feed and other cost components. For example, using $.95 feeder steers in Alberta (the difference of $.10 compared to the earlier example approximately accounts for the cost of moving feeders from Alberta to Ontario), $220 for feed and $54 for other cash costs for 245 days (other costs are lower because daily yardage charges in Alberta accumulate to less because of the shorter feeding period), an increase in interest rates from 15 to 20 percent adds $18.94 per head. Perhaps, more importantly, the difference in interest costs between Ontario and Alberta at 15 percent is $21.36 per head, while at 20 percent it is $28.50.

These realities change farm management decisions but they also imply some rather fundamental changes in absolute advantage. Factor high interest rates, plus programmed increases in freight rates for feeders (based on planned energy prices alone), and lower costs for shipping final product as a result of boxed beef into an analysis of regional advantage for beef production and you are led rather quickly to the conclusion that the advantage is moving westward. This is already causing substantial need for Ontario's beef producers to make hard management decisions, but may, in the longer run, cause other agricultural managers to make decisions--e.g., who gets financing; what packing plants should close; where new ones should be built, etc.

A second macro-economic example concerns exchange rates. Despite high interest rates, the federal government's failure to control its deficit, plus its outstanding performance in discouraging investment in Canada has resulted in a rather embarrassing value of the Canadian dollar. In our part of the country we have been experiencing rapid growth in corn and soybean production. The result has been the development of a fledgling export business for corn and, in the case of soybeans, a crush and re-export business with some value added to the local economy.

Most transactions in this business are made with accompanying hedges on the Chicago Board of Trade. Have you ever considered what a sudden drop in the dollar from $.82 to $.77 does to the local basis for corn, beans, meal and oil and thus the effect on net buying cost for an exporter or on the crush margin of an importer/exporter? It can be rather devastating. This causes the management of these companies the necessity of deciding whether to hedge the dollar simultaneously or to carry the risks. In either case, it increases our costs and the difficulty of competing.

Stabilization Policy

Agricultural stabilization policy, with the exception of the WGSA and, perhaps, one or two provincial programs, is a joke in terms of its stabilizing effects. But some managers don't always think it's funny.

One beef producer a few years ago confided to me that he planned to use the previous year's support level for fed cattle under the A.S.A. as a basis for pricing his replacements. My response was that to do so would probably have one of two results: either he would never bid enough to buy replacements, or else, if he could, he would lose money. The program should allow him to do as he had planned but its organization is such that it won't (see Martin 1976). When government policy adds uncertainty to the management environment, it can do nothing but impair performance.

A second aspect of the stabilization scene is the apparent bidding war for market share in red meats which has taken place among provinces the past year or two. These programs are quite clearly aimed at altering management decisions. This whole scene runs the risk, in my view, of being very expensive. In the long run, the winner of the bidding will be the province with the largest budget. If, along the way, production is maintained or expanded in areas where it should not be on the basis of natural advantage, and if secondary management decisions regarding employment and investment in processing are affected, what will happen when provinces with smaller budgets lose the war? The answer to that is severe dislocation.

Supply Management

A number of interesting effects on management decisions seem to be taking place as a result of current and projected regulation surrounding supply management. In discussing this area three examples are used. The first has to do with the effects of potential regulation, the second with the effects on unregulated producers of competing with those from regulated sectors, and the third with the effects of regulation within the regulated sector.

Potential regulation. Political pressure for extending supply management to the red meat sector has provided the impetus to expand production in spite of market signals to the contrary. There are innumerable examples of this in the pork sector of Ontario: some producers maintained output in 1981 despite losses in 1980; others entered production during this period; while still others overcrowded hogs in existing capacity. This phenomenon has come to be known as "the race for base"--i.e., an attempt to establish a quota base on the possibility that supply management might come to be. Under the circumstances these were risky but, nevertheless, logical management decisions which affected market performance.

Inter-commodity effects from regulation. Many nonregulated producers are finding it more and more difficult to compete for resources with regulated producers who look for new areas in which to expand, either for the sake of growth or to avoid taxes. Examples include the feather producer who expands into cash cropping and the feather or dairy producer who competes for feeder cattle to place in the local custom lot.

Constraints to growth in one sector simply result in enterprising people finding alternatives. This is natural but it puts new competitive pressures on the unregulated producer, giving rise first to misallocation of resources and second to increased pressure toward increased regulation, partly to offset the effects of existing regulation.

Effects within regulated sectors. Probably everyone associated closely with agriculture can point to countless examples of effects that regulation has had on managers within a regulated sector. I'll choose one which I feel is becoming increasingly pernicious.

In the broiler sector, where domestic production, imports and farm prices are tightly controlled, the structure of the final retailing industry is rather highly concentrated. I would hypothesize that the competitive structure of the regulated market has allowed retailers to exercise their power more fully and thus keep retail margins high. One retailer knows that his competitors cannot do anything to elicit more production domestically nor to import lower priced product. Thus market shares are reasonably insulated from competitive forces and there is little reason, nor payoff, to enter into major price competition.

This implies that with a monopolistic marketing board at one end of the chain and oligopsonistic retailers at the other, the processing sector finds itself caught between a rock and a hard place. They have little bargaining power with either suppliers or customers and often feel they are caught in the trap of holding very expensive inventories when production is allowed at levels too great to clear the market at regulated prices. The pressure to fall into this trap occurs because business firms, unlike marketing boards, usually have the objective of maintaining or expanding market share. Thus their costs have risen because of high inventory carrying charges. And, in much of the country, these costs are even higher because frozen product necessarily takes a discount at retail.

In Ontario, at least, some of the processors are also integrated into production (so they hold or control broiler quota) and into feed production. These companies have three kicks at the cat (or chicken as it were) to make a profit. Other companies are not integrated but only process and must rely on this single activity for their profits.

As a result, there are possibilities for management decisions in this atmosphere which can be used to expand market share in broiler processing.

I'm told (but can't prove) that one recently popular strategem was to report feed prices at levels somewhat higher than sales occurred. These were reported to the Canadian Livestock Feed Board. Since CLFB reported prices are used in the cost of production formula for broilers, this conveniently placed upward pressure on administered prices. Thus the integrated company received a healthy return on the broilers they produced and the administered prices for broilers likely helped revenue from feed sales. Thus the integrated company could be in a profitable position in

two of its three production enterprises. This provides them the opportunity to take short-run losses in competing for market share in broiler processing. But the nonintegrated company does not have this opportunity.

In my view, this story is made possible by the necessary condition of a tightly regulated raw product market and the sufficient conditions of an oligopsonistic retail market and the conduct associated with integration. The impacts are: (1) high operating margins at both the processing and retailing sectors (Table 1 contains average processing and retailing margins for broilers in Canada and the United States before and after 1971); (2) an opportunity for concentrated industries to exercise their market power; and (3) pressures for even more concentration in the longer run--which cannot bode well for market performance.

Conclusions

What does one conclude from all this? Clearly the market system is complex and interrelated. Regulation, which is always done with good intention, often has effects far beyond what is initially intended. The result is that the long-term payoff of regulation is much smaller than anticipated.

Many of us in "academic ivory towers" and "back concession farms" have been saying for years that what is needed is a carefully thought out set of long-term policy objectives, accomplished by instruments the impacts of which have been carefully analyzed before the fact by policy analysts who understand the interactions in the marketplace. What it appears that we have had is a series of short-term fingers in the dyke, which simply builds up new pressures on other parts of the dyke. The market system is simply too complex to continue with our present approach. Our history of policy development can be characterized as stumbling from one level of regulation to the next, often with the current set of regulations being put in place partly to offset the effects of the last one, without sufficient understanding of the long-term consequences.

Furthermore, much policy is developed by politicians and civil servants who have had to make few business decisions in life. Thus it is not surprising when policy leads to unexpected results: the architects often don't know what to expect. It is also apparent that insufficient consultation with industry is currently being undertaken in policy design, or worse, policy is designed in spite of the consultation. Current development of the latest red meat policy is an example of the latter; the so-called agri-food strategy is an example of the former.

It seems increasingly that the real ivory towers are located in Ottawa. Until the architects of policy leave them and begin to develop policy with consistent long-term objectives in consultation with those who will be regulated, the role of the university economist as a public critic will remain an easy one.

Table 1

Average Processing and Retailing Margins, Broilers, Per Pound, Canadian and the United States - 1965-71 and 1972-80

	Canada	United States	Canada minus United States
	------(Canadian ¢/lb. Eviscerated)--------		
Processing Margins			
1965 - 1971	8.74	8.42	.32
1972 - 1980	18.41	10.07	8.34
Retail Margins			
1965 - 1971	11.13	14.15	-3.02
1972 - 1980	25.20	20.38	4.82

Source: Elahi

References

Elahi, K.Q., Stability in Commodity Markets - An Analysis of the Performance of Four Marketing Boards in Canada, unpublished M.Sc. thesis, University of Guelph, 1982.

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THE EDUCATION OF AGRICULTURAL BUSINESS MANAGERS: FACULTY OF AGRICULTURE OR FACULTY OF BUSINESS?

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Introduction

The intial title of this paper asked the question whether future farm business managers will be educated in Departments of Agricultural Economics or in Faculties of Business. We have extended this to include as well agricultural businesses beyond the farm gate and interpreted the question as asking whether the best location is the Faculties of Agriculture, in which Departments of Agricultural Economics are located, or in Faculties of Business. In our view, Departments of Agricultural Economics are, or ought to be, integral parts of their Faculties of Agriculture, and the education of students in agricultural economics also presumes an education in other parts of the Agriculture Faculty. John Stuart Mill, perhaps the first agricultural economist, pointed out "a person is not likely to be a good economist who is nothing else." The same may perhaps be said of agricultural economists. In what follows, we shall argue that, for agriculture at least, the environment and the issues are sufficiently unique that a person is also unlikely to be a good manager who is nothing else.

It is worth recognizing that our tendency to look upon farm management as a segment of economics is itself a recent development, one which owes its origins largely to the work of John D. Black and Earl Heady, whose pioneering work showed the relevance of microeconomics to this field. But farm management, and indeed agricultural economics (or rural economics) grew initially out of the general discipline of agriculture, and arose largely in the U.S. state colleges, universities and experimental stations in the last half of the nineteenth century. In Canada, as well, early instruction in farm management or agricultural economics arose, not as a subset of economics, but usually associated with other agricultural disciplines. Two nearby examples are at hand. Here at the University of British Columbia, the initial work in agricultural economics was by H.R. Hare in the Department of Animal Husbandry. At Washington State University, this work arose in Agronomy through the work of W.J. Spillman.

The current structure of agriculture suggests needs to maintain the earlier interdisciplinary nature of education for farm managers. One example is from the farmer profile in the Farm Management Field Laboratory (FMFL) Project at the University of Alberta. FMFL farmers in 1980 controlled

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assets in excess of $900,000 per farm, and had average expenses (excluding capital purchases) in excess of $120,000 per farm. These farmers employ substantial amounts of nonowned capital, and maintain operations which reflect needs for considerable technical agricultural knowledge as well as management of capital, personnel and legal, financial and technical responsibility. Yet, many of these operations maintain minimal farm records, make decisions based on recollections of past experiences, and operate with a management approach which is either not well defined in their own view or, at the very least, one which they find it difficult to articulate.

In addition, farmers deal with a host of agricultural input suppliers and marketers of their products. The growth of agricultural business in rural areas of this country in the past decade has been rapid, as farms have become increasingly intensive with inputs acquired from nontraditional sources. The explosion of the farm services industry already experienced in many parts of the United States appears now to have made its appearance on the Canadian scene, and as a consequence is a greatly heightened need for business managers with agricultural knowledge and management expertise both on and off the farm. These changes dictate a need for a new approach to agricultural education, one which is not well met either in our traditional science-based on programs in Agriculture, or in the typical programs in the business schools, which provide a more general approach than that best suited to essentially small business management in agriculture.

Farm Management Skills - Past, Present, and Future

Successful farm operators, like other types of managers, have an awareness and appreciation for the broad range of business competencies and skills which are important to them. Furthermore, they are continually confronted with the dynamics of change as viable businesses continue to grow larger in size and capital requirements; as farm technology increases in complexity; and as the need to interact with others, such as employees and agribusiness personnel, increases.

In fact, the competency and skill requirements of the farm operator cover a much wider range than is often the case for managers in larger urban corporations, where departmentalization of the management tasks usually leads to sharing of the total management function. The typical owner-operator of a commercial farm in western Canada needs to be familiar with the whole range of management activities usually undertaken by individual division heads in large corporations. This phenomenon will undoubtedly continue for at least several generations into the future since as the family operated farm will continue to be the predominant form of structure.

With these assumptions in mind, what competencies and skills are relevant now and in the future for successful management of farms? A reasonably good source is the Canadian Farm Business Management Training Project. It was begun in 1974 under the auspices of the Canada Farm Management Committee (CFMC) with impetus particularly from the Small Farm

Development Program, a federal-provincial program undertaken in 1970 to speed up farm adjustment to changing conditions. Relatively large staffs of professional counsellors were employed (several hundred) jointly by the federal and various provincial governments to man the Small Farm Development Program (SFDP). It became evident that these counsellors were not sufficiently trained to counsel farmers effectively so a project such as the Canadian Farm Business Management Training Project was appealing. Consequently, the SFDP underwrote much of the early development of the training project.

While the viability of the project suffered with the demise of the SFDP in 1978, a large amount of thoughtful work went into the preparation of a model curriculum of competencies and skills needed by farm management counsellors and consultants. Adapted from the Developing A Curriculum (DACUM)[1] approach, the curriculum was prepared by a working committee of about a dozen people meeting on a number of occasions beginning in 1975. On the committee were farm operators, farm management teachers, researchers, and extension workers, as well as representatives from potential employers of farm management counsellors.

The results of these deliberations are shown in the following table. General areas of competence are listed vertically from A to K, while the specific skills within each competency area are shown horizontally. It will be noted that there are 11 competency areas and a total of some 80 skill modules allocated to the competency areas. (See attached Table).[2]

The interdisciplinary nature of the resulting DACUM chart is obvious. It is clear that practitioners consider farm management to be more than agricultural economics. Included are such topics as personnel management, counselling and communication skills, extension principles, and law and legislation. Furthermore, a number of the economics oriented skills include those which either are not taught or are given only minor emphasis in the usual agricultural economics teaching program. Included here are such specific skills as setting up filing systems, analyzing a balance sheet, time management, and principles of goal setting to mention several.

Finally, it should be pointed out that performance objectives developed within the skill areas, both economics and noneconomics oriented, are more explicit that those expected of students in current university degree programs, and in many cases require skills differing from those currently provided to students in the B.Sc. (Ag) program.

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[1] Adams, R.E., DACUM: Approach to Curriculum, Learning and Evaluation in Occupational Training, Ottawa: Canada Department of Regional Economic Expansion, 1975.

[2] See also A Guide to the Purpose and Use of the Canadian Farm Business Management Modules, Agriculture Canada, no date.

Table 1

The Canadian Farm Business Management Training Project

A. COMMUNICATE, COUNSEL AND INTERVIEW	1. Role of the Counsellor	2. Building and Maintaining Trust	3. Influences in Communication	4. Develop Communication Skills	5. Develop Skill in Motivation	6. Develop Skill in Needs Identification and Goal Setting	7. Develop Skill in Resolving Conflict	8. Understand the Concept of Power in Counselling	9. Conduct Interview Sessions
B. PLAN, IMPLEMENT AND EVALUATE FARM MANAGEMENT EXTENSION ACT.	1. The Rural Community and the Processes of Change	2. Principles and Practices of Extension Education	3. Planning Farm Management Extension Activities	4. Implementing Farm Management Extension Activities	5. Evaluating Farm Management Extension Activities				
C. ASSIST IN ESTABLISHING AND MAINTAINING FARM RECORDS	1. Identify and Select Accounting Systems	2. Establish and Maintain Paper Handling Systems	3. Record Business Information	4. Prepare an Income Statement	5. Prepare a Balance Sheet	6. Prepare a Cash Flow Statement	7. Prepare a Source and Application of Funds Statement	8. Prepare Enterprise Cost and Return Records	9. The Selection and Maintenance of Physical & Prod. Records	10. Prepare and Maintain Climatic Records
D. ADVISE ON OBTAINING, ORGANIZING AND MANAGING FARMING RESOURCES	1. Available Resources and Methods of Resource Acquisition	2. Evaluate Alternative Growth Strategies	3. Time Management	4. Organization and Utilization of Farm Labour Inputs	5. The Econ. of Selecting, Organizing and Managing Cropping Programs	6. The Econ. of Selecting, Organizing and Managing Livestock Programs	7. The Econ. of Selecting & Using Mach. and Materials Hand. Systems	8. The Econ. of Selecting & Using Bldgs. and Storage Fac.		
E. ADVISE ON FINANCIAL MANAGEMENT	1. Calculate Credit Costs	2. Evaluate the Use of Credit and Alternative Credit Sources	3. Analyzing the Farm Business Using Records	4. Analyzing the Farm Business Without Records	5. Preparation and Use of Cash Flow Projections	6. The Use of Capital Budgeting Techniques	7. Tax Management Strategies			
F. ADVISE ON METHODS AND TECHNIQUES FOR EVALUATING ALTERNATIVES	1. Identify Problem Areas and Possible Alternatives	2. Identify and Utilize Enterprise Budgeting Data Sources	3. Prepare and Use Partial Budgets	4. Prepare and Use Complete Budgets	5. Preparation of Complete Farm Plans	6. Risk and Uncertainty	7. The Influence of Timing of Inputs and Outputs in Bdtg.	8. Appraisal Techniques		
G. ADVISE ON MANAGEMENT IMPLICATIONS OF LAWS AND LEGISLATION	1. Assessing Legal Requirements for Wills, Estate Planning & Ad.	2. Analyzing Rights and Obligations Under Administrative Law	3. Securing Adequate Legal Advice on Land Law	4. Assessing Liability Implications Under the Law of Torts						

Table 1 (continued)

H.	ADVISE ON MARKETING	1. The Selection of Markets and Mktg. Prac. for Gr. & Oilseeds	2. The Selection of Mar. & Mktg. Prac.for Livestock and Live. Products	3. Using Contractual Marketing Arrangements	4. Using the Futures Market	5. Using Alternative Marketing Organizations	6. Using Market Trends and Outlook Information					
I.	ADVISE ON BUSINESS ARRANGEMENTS AND ESTATE PLANNING	1. Rental and Lease Arrangements	2. Establishing Business Agreements	3. Father-Son Agreements	4. The Use of Sole Proprietorships	5. The Use of Partnerships	6. The Use of Corporations	7. The Use of Cooperatives	8. Retirement Planning	9. Establishing Farm Transfer Plans	10. Preparing and Updating Wills	11. Financial Implications of Alternative Bus. Structures
J.	INFORM AND ADVISE ON FARM EMPLOYEE MANAGEMENT	1. Hiring, Terms and Conditions of Employment & Term. Proced.	2. The Use of Fringe Benefit and Incentive Programs	3. Supervision, and Delegation of Authority and Responsibility								
K.	BUSINESS MANAGEMENT, CONCEPTS, PRINCIPLES, AND PROCESSES	1. Understand the Economic, Physical, Soc. & Pol.Environ. in which Farm. Operate	2. Understand Management Processes Applicable to Farm Business Management	3. Counsel Farmers on the Appl. of Management Pr. to Management Problems	4. Assist Farm Families in Establishing Goals and Objectives	5. Assist Farmers in Recognizing Needs For & Using Information Sources	6. The Basic Economic Principles of Farm Production	7. The Effects of Time, Uncertainty, and Farm Household Interrelationships on Basic Economic Principles	8. Economic Principles Applied to Farm Product Marketing Strategies	9. Apply Accounting Principles to the Preparation of Financial Records		

The Canadian Farm Business Management Training Program deals with those competencies and skills perceived to be important as of the middle 1970's. There may well be emerging skills which now need emphasis as a result of changes in the farming scene. One area which has been identified repeatedly is that of financial management, obviously as a result of rapidly growing capital requirements coupled with rapidly rising interest rates. The importance of this skill has been driven home by observation of the number of farm operators who have been forced to liquidate as a result of cash flow problems.

An integral component of financial management is the ability to analyze and interpret financial statements such as the balance sheet, the income statement, and sources and uses of funds statement. In times of rapid price changes, these frequently take on added significance often overlooked by counsellors and farmers. Skills for dealing with risk and uncertainty are also becoming relatively more important. Researchers have not committed sufficient resources to this area. Farm counsellors and operators have tended to underestimate the impact of uncertainty brought about not only by weather and prices, but also government policy and economic conditions at home and abroad.

Before leaving the discussion on present and emerging skill requirements for farm counsellors and farm managers, it should be emphasized that the typical commercial farm is different from most other businesses. It approximates the "perfectly competitive" firm described in economic theory. This creates an important difference between the nature of decision making by the farm operator, as compared to his urban counterpart. He is a price taker and a quantity adjuster. Decisions consequently focus on the most profitable level of production and the least cost mix of inputs for a given price level. The urban manager on the other hand, invariably deals with a differentiated product or service, where pricing, advertising and merchandising policy become the main types of decision making activity.

This distinction should not be overlooked when developing training programs for farm managers and farm management counsellors. It would be a mistake to assume that their training needs are identical simply because they are both management trainees. On the other hand, perhaps farm managers of the future need to learn more about the world of imperfect competition, including product differentiation, advertising, pricing policy and all of the variables which accompany this economic model. After all, a growing number of farm firms have successfully entered this field. Examples are pure bred cattle and registered seed producers as well as producers of special labeled products which are produced and marketed through an integrated system. At the same time, it can be assumed that most farm operations will remain in the domain of the perfectly competitive model.

Where We Are Now As Far As Teaching Content

Generally speaking, Faculties (or Schools) of Agriculture in Canada have a biological science orientation. Graduates with a B.Sc. in Agriculture

from the University of Alberta, taken as typical for the country, will have begun their first year enrolled in 10 course units (a unit consists of a three hour per week course, plus laboratory time over a 13 week term). Thirty percent of this course time is devoted to the basic sciences, chemistry and biology. Twenty percent is devoted to introductory economic theory. An additional 20 percent consists of mathematics and statistics. The remaining 30 percent consists of English, communication skills and agricultural history. In their remaining three years of the four year program, the graduates will have successfully completed an additional 30 course units selected according to the specialty pursued. At the University of Alberta they will major in one of 10 specialized programs, or they will choose a general program. The specialty of Agricultural Economics, which has the greatest business orientation of the specialties offered, provides studies into farm and ranch management, marketing, natural resources and rural development. Nevertheless, it too fails to provide adequate depth in accounting, quantitative approaches to management, legal relations, finance and taxation, organizational theory and possibly industrial relations. Registration quotas and time limitations largely preclude agriculture students from building such areas of study into current programs.

Faculties (or Schools) of Business in Canada have an orientation towards graduating students who will be able to function in the business community. An excerpt from the University of Alberta Calendar summarizes the underlying philosophy in the B.Com. program:

> The Bachelor of Commerce program seeks to provide the student with a broad background in the different areas of business as well as in related fields in the humanities and social sciences. The business world and its environment have changed enormously in the last twenty years and will change at an even faster pace in the next twenty. In this trend, questions about the environment will become increasingly important. No school of business can possibly teach the solution to problems which will arise several years from now. A school should, therefore, seek to provide a basis for effective self-learning through actual experience by teaching the broad underlying fields of knowledge which are basic to business. The emphasis is upon the development of a comprehensive analytical framework within which various organizational problems can be analyzed.

To achieve the objectives set out, students are allowed to major in one of five fields of study, including accounting, finance, management science, marketing or industrial relations. In addition, supporting courses are offered in managerial economics and in organization theory. The concept, however, is that of educating managers who need not be intimately involved in technical aspects of this industry. There are some students, a very few, who have attempted to build courses in agricultural economics or the technical agricultural sciences into their programs. A two-degree sequence, B.Sc. (Ag) and M.B.A., might fit the needs of many

students, but is normally a six-year program. The B.Com. program also includes a number of students who expect to return to a farm, and also as accounting majors whose objective is to establish a rural practice. For these students as well, some form of joint or integrated program appears desirable.

What Educational Resources and Contents Are Needed For The Future

Agricultural businesses today and most assuredly into the future will need the services of highly trained managers. This is as true for farm businesses as it is for those firms dealing with the farmer. This view is shared by leaders of the farming community as in the case of an Alberta farm organization which has stated:

> We, as an organization are continually faced with member problems in financing, taxation, input costs and pricing of products. It is therefore becoming increasingly important to know how to handle financing in the production of food.

A representative of a leading agricultural consulting firm makes the observation that:

> The current level of capital investment, financial constraints profit margins and information sources confronting Alberta farmers has created a real need for more academic training in the business management field. As well, small to medium sized operations or departments within large firms require a high level of business management including organization, time management, and financial management, profit orientation and quality control. The field of agricultural consulting requires expertise in both farming and agri-business. The academic and practical training is needed for the farmer, the agri-business individual or the consultant advising and working with either group.

A banking representative also detects deficiencies in presently meeting the needs of the industry.

> Having noted that farm business management is an essential ingredient in modern day farming operations, I feel it necessary to express a concern that this element of agricultural training has probably not received the needed level of support in virtually any of the University Agricultural Departments across Canada.

These views are reinforced by a survey of recent B.Sc. (Ag) and B.Sc. (For) graduates of the Faculty of Agriculture and Forestry, and recent Master's level graduates of the Department of Rural Economy. These students scored past studies in agriculture business high in relevance, and also rated it highly as an area for further academic study.

As currently oriented, neither the Faculties of Agriculture nor the Faculties of Business are well able to meet the emerging needs of technical and managerial competence. What appears required is a background of agricultural science, including its biological, engineering and economic components blended with managerial skills consisting of accounting, finance, marketing, and staffing.

The Approach at the University of Alberta

For several years, the Alberta Agricultural Advisory Committee, and others, have urged a strengthening of joint agriculture-business programs. We find that employers have been seeking students with abilities in both agriculture and management and that a few students have been attempting similar programs by combining successive degrees in agriculture and business. While this is a possible combination for those who have the time and enthusiasm, it is a lengthy program. It also covers more areas than are attractive to many potential students. Current program offerings at the University of Alberta are also complicated by the fact that the Faculty of Agriculture and Forestry is not a quota faculty, while the Faculty of Business imposes strict quotas on student enrollment.

What appears needed, and appears wanted by both employers and students, is a joint program between the Faculty of Agriculture and the Faculty of Business, blending essential aspects of a small business management program with essential aspects of the agriculture sciences (including social sciences). Such a program is now being developed within the University of Alberta by Rural Economy staff. While ideally it will be a joint program between these two faculties, the Faculty of Business is reluctant to enter into new programs because of current student numbers and it is, therefore, possible that the program will become a new interdisciplinary program within the Faculty of Agriculture and Forestry.

The program we have proposed is not yet a reality. We hope it will be in the very near future. But we think the answer is clear to the question we started out with--the best programs in agricultural business will be located where there are strong agriculture faculties and strong business faculties. Agricultural economics and management will be important parts of that program and will serve a vital integrating function if they recognize that John Stuart Mill's comment can be paraphrased as follows:

> The best agricultural business managers will be those who know something about both management and agriculture.

MARKETING ISSUES

Chairman: Peter L. Arcus*

URBAN INTERESTS IN SUPPLY MANAGED COMMODITIES

J.D. Forbes**

Introduction

This paper identifies and specifies the interests of urban Canadians in supply managed (SM) commodities. First it defines urban Canadians and draws from several sources to outline their interests in food policy. Then supply managed commodities are defined and analyzed in light of those urban interests. The penultimate section of the paper presents an interest group representation hypothesis to explain why urban Canadian interests are less than optimally served by existing supply management schemes. The final section of the paper presents some concerns on the direction of Canadian agriculture in general and SM commodities in specific. It suggests avenues open to agricultural economists to contribute to improving and expanding the search for better alternatives to present agricultural regulatory programs.

Who Are Urban Canadians?

Statistics Canada classifies 75.5 percent of Canadians as urban, using as their criteria of "urban" measures of relatively high population densities in census tracts or population per square mile in untracted areas (21, pp. 10-11). However, geographic residence would seem less important for classifying groups for our purpose than identifying those who receive economic benefits from supply management programs and, alternatively, those paying the costs of these regulatory interventions. In this case, well over 95 percent of Canadians are not directly involved in supplying the inputs for, producing or processing and selling the regulated products. This group shall constitute the group referred to as "urban."

The term "producers" shall refer to producers of the SM commodity. This classification is based on the fact that regulatory activities for the SM commodities discussed below always favor producers and almost always benefit suppliers of inputs. The regulatory policies generally result in negative consequences--reduced volume and/or higher prices--to processors, distributors and retailers of the regulated product and to its consumers (15, p.33). We do not analyze the interests of suppliers of inputs and the processing and distribution sector only because of the focus of the paper not because they are unimportant. (See 12, Chapter 4, for a discussion of these latter interests.)

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What Supply Managed Commodities?

Dairy, eggs, chickens and turkeys, the nationally regulated commodities, have been chosen for this analysis because their activities are those of greatest concern to urban Canadians. They also illustrate the heterogeneity of powers and mixed jurisdictions which are gathered under the umbrella term, supply management. Dairy regulation is split between 11 jurisdictions, joint federal-provincial regulation of manufacturing milk and 10 provincial fluid milk regulating agencies. The powers of these agencies is quite varied but each, in effect, sets the price and production levels for the product under their aegis. In addition, some fluid milk jurisdictions set prices in the distribution system after the farm gate. For feathered products, both price and production levels are set nationally for eggs, while for chickens and turkeys production is set nationally but provincial marketing boards set provincial producer prices.

What Are Urban Interests in Supply Management?

We have identified five urban interests which have been claimed for SM commodities. They are:

- an adequate food supply of adequate quality,
- fair food prices, defined in this paper as prices that average out at long-term equilibrium levels or regulatory actions resulting in movement toward long-term equilibrium levels and without severe regulatory supply restrictions,
- relatively stable prices around that long-term equilibrium level,
- long-term economic efficiency of resource use, and
- confidence that urban interests are being adequately represented in the regulation of the SM commodity.

Before proceeding with the analysis of urban interests in SM commodities it is instructive to differentiate between individuals' interests as consumers and the public interest; too often they are treated synonymously and in so doing public policy and regulatory activities become confused. In this paper we use Lewis' (17) definition of the public interest as being the government (or its agents) balancing the interests of the providers of labour, the owners of capital and the consumers of output to the maximum benefit of society as a whole.

It is obvious that only a very small proportion of Canadians are other than consumers in the SM situation. Therefore, in determining the public interest, there must be a strong case that the small proportion of the Canadian population receiving the benefits of regulation does, in fact, require those benefits and at the level generated by the SM regulations. It would appear that regulatory agencies would want to monitor the need for benefits and that they be able to publicly account for the effects of their regulatory activities on the income transfers they have the power to control. It follows then, that under any economic market regime, or

when the market is replaced by a regulatory environment as in the SM case, individual consumers have no reason to be any more concerned about producer welfare than they would be concerned about the general welfare of all individuals in society. If the regulatory agency is convinced that producer welfare needs improvement they have the power to improve it. That agency also has the responsibility to insure that the producer welfare is not excessively improved and is in balance with the interests of society as a whole. Such questions are judgmental. Regulators render public interest judgments and the data on the results of regulatory activity for SM commodities presented below reflect those judgmental decisions.

How Have Urban Interests Faired In Supply Management?

Each of the five urban interests in SM identified in the previous section are evaluated in light of the results of the regulatory activities for dairy and feathered products.

Adequate food supply of adequate quality. Food adequacy is a difficult concept to measure since either before or after the institution of SM regulation urban Canadians have been able to buy all the SM commodity they desired at the price offered. It seems safe to say that urban Canadians are little affected by the food adequacy criteria. However, the need for strong measures to restrict output at the price paid producers for feathered products and for fluid milk and for most industrial milk indicate that supply is adequate and would be excessive were supply restrictions not imposed. Evidence of this fact include producer levies to dispose of excessive stocks of eggs and industrial milk and past grants by governments for disposal on world markets of excess supplies of some SM commodities. In the case of dairy products, the supply of foreign production is prohibited or restricted so that there is an absolutely inadequate supply of these commodities. None of the factors of production for the SM commodities is in short supply, except the right to market.

It can only be concluded that meeting the food adequacy criterion has not been a problem. However, neither have we seen any evidence that supply was inadequate before the implementation of SM regulatory schemes. To avoid repetitious citations, and because of the direct relationship between supply and price, documentation of this section of the paper is relegated to the one which follows.

There have been allegations by some groups that quality of SM products have increased under SM and counter allegations to the opposite extreme (especially on egg quality). There is little reason to believe chickens, turkeys or milk quality would be affected by SM activities. Egg quality will deteriorate if layers are allowed to lay to an older age without molting. A preliminary analysis of the Canadian production of Grade A large and extra large eggs relative to all egg production shows a significant increase between 1971 and 1981. In 1971 these two grades constituted 57.1 percent of Canadian eggs graded. By 1981 the proportion had risen

to 63.0 percent (1, various years). This trend was highly significant (p=.000). One possible explanation for this trend is that significantly higher prices are paid for these classes of eggs. There would be a tendency for producing eggs of lower quality (thinner shells and watery contents) if SM pricing encouraged keeping of older flocks as I have heard charged by various groups over the years.

While there are indications, at least for eggs, that quality has declined for products under SM, I do not think strong conclusions may be drawn on either side of the issue.

Fair food prices. Table 1 presents a summary of the most recent estimates of what must, in most cases, be an indication that prices for SM commodities exceed equilibrium levels. Because of the variety of methods in analyzing and calculating prices in the Table, and because some of the authors estimate regulatory costs plus producer transfer benefits in aggregate rather than in per unit terms, care should be exercised in interpreting the data as presented. Only Veeman (22), Barichello (5) and Josling (16) attempt to estimate equilibrium levels. Others do not attempt to estimate supply and price effects on output and consumption. Taking these problems of interpretation into account, one must conclude that SM marketing boards have been able to raise prices above long-term equilibrium levels. Elahi (11) has shown that Canadian retail prices were the same or below U.S. prices before national SM for feathered products was introduced and have since risen above U.S. prices. The margin between producer prices net of feed costs between the two countries has continued to widen over time.

Clearly urban interests in SM have not been served under the criteria of equilibrium prices or movement toward equilibrium price levels. In fact, increasing quota values, to be discussed shortly, indicate that prices continue to move away from equilibrium levels.

Relatively stable retail prices. There is no doubt that retail prices of feathered products have been less variable than they were previous to SM regulation. Elahi (11) has carried forward previous work by Martin and Warley (19) and has shown that the coefficient of variation (CV), which measures the amplitude of change, was lower after than before SM for all feather products. There is no information I have found on the frequency of price changes for feathered products nor any analysis of changes in milk prices.

It should be noted that there is no research of which I am aware that shows consumers place a high value on price stability for frequently purchased food products, especially if they must pay for that stability with higher prices. In fact, Albon (2) has shown that under some conditions, consumers are worse off with stable prices. As with the case of the food adequacy interest, the value of price stability has most frequently been cited as a benefit of SM by its proponents with no empirical research to justify the value, if any, of price stability to urban Canadians.

Table 1

Estimates of Excess Prices to Consumers, Annual Aggregate Total of Costs and Transfers of Regulation for Four Supply Managed Commodities, Per Average Producer, Canada

Researchers (date[s] of estimates)	Milk	Eggs	Chickens	Turkeys
	Producers 59,500 - 62,600	2,300	2,300	587
Elahi, 1982[a] (1975-80)		13¢ per dozen $56 M annual cost $24,500 per producer	6¢ per pound $45 M annual cost $19,600 per producer	9¢ per pound $19 M annual cost $31,700 per producer
Arcus Consulting Limited, 1981[b] (1981)		13¢ per dozen $57 M annual cost $24,700 per producer		
Arcus, 1981[c] (Feb. 1980)		6 - 28¢ per dozen depending on prov. $45 M annual cost $4,000 - $70,000 per producer, depending on province	5 - 14¢ per pound depending on prov. $70 M annual cost $11,000 - $65,000 per producer, depending on province	
Veeman, 1982[d] (1979)		6 - 24¢ per dozen $25 - $100 M annual cost $11,000 - $43,000 per producer	5 - 12¢ per pound $42 - $106 M annual cost $18,000 - $46,000 per producer	2 - 18¢ per pound $4 - $41 M annual cost $7,000 - $70,000 per producer
Barichello, 1981[e] (1979) 59,500 producers	$1.27 B annual cost $21,300 per producer			
Josling, 1981[f] (1978) 62,600 producers	$1.37 B annual cost $21,900 per producer			

(footnotes on following page).

Footnotes for Table 1

[a]Elahi (11) estimates producer revenues, net of feed costs, for eggs to be 12.85 cents per dozen higher in Canada than the United States after supply management (1975-1980). At 439 million dozen this translates to $56.4 million annual cost or $24,500 per producer. The unweighted average annual production of chickens and turkeys for 1975-1980 (eviscerated wt.) was calculated from (1) at 747.1 and 215.9 million pounds, respectively. These production figures were multiplied by the net change in producer revenues, net of feed costs, in Canada over the U.S. (6.03 and 8.63 cents per pound for chickens and turkeys), as reported by Elahi (11), to arrive at the average annual cost estimates. Boyd (7) provided an estimate of the number of turkey producers.

[b]Arcus Consulting Limited (4), Table 10, p. 55, estimates excess price sufficiencies. An average of excess sufficiencies, weighted by provincial production proportions, was calculated by the present author at 12.946 cents per dozen. At 439 million dozen this translates to $56.8 million annual cost of $24,700 per producer.

[c]Arcus (3) calculated all entries as reported here.

[d]Veeman (22) calculated a range of estimates of the differences of Canadian prices from equilibrium levels. One group of estimates used quota values to estimate prices above equilibrium levels (the lower estimates in the Table). The higher estimates compared Canadian prices to U.S. prices for each commodity. The present author converted the aggregate annual cost estimates to a per producer basis.

[e]Barichello (5), p. 77, in 1980 dollars and (10). Includes transfers, government payments and consumption and production losses due to supply restrictions.

[f]Josling (16), Table A.2(b), and (10). Row 3 titled "Total Consumer Costs".

Efficient resource use. Efficient resource use under SM includes considerations of costs of compliance (or regulatory activities), use of resources, capacity utilization, quota values, and x-efficiency. Four concerns are treated here.

First, I have shown elsewhere (14) that regulatory costs for SM of eggs costs between 2.5 and 5 cents per dozen. This translates from $5,000 to as much as $11,000 annually per producer in the scheme and almost surely has a negative impact on efficiency if for no other reason than the added costs of regulatory schemes to the economy.

Second, when supply is restricted an over-capacity situation exists. While over-capacity is difficult to prove in many instances, its alleged existence is a constant source of complaint from producers of eggs and turkeys. Excess capacity manifests itself as part of the reason for the large and rising prices paid for production rights to be discussed shortly.

Third, supply restriction and prices above equilibrium levels result in gains to current producers, a real cost to producers purchasing it, a regressive tax on lower income Canadians and contribute to inflationary pressure and lack of competitiveness on a national scale. Estimates of aggregate quota values in Canada are presented in Table 2. These values are several years old by now and have risen in nominal terms. I am unaware of an analysis of quota value in real terms.

Fourth, there is some evidence that removing the competitive pressures for efficiency have led to excess resource use and higher costs, the x-efficiency concern. The first evidence is the fact that dairy producers in New York State use significantly fewer fixed assets per cow than do Ontario dairymen (20 and 23). On the other hand, output per cow has continued to increase over time (10). Second, Loyns and Begleiter (18) present evidence that suggests that egg farmers in Ontario were relatively less efficient than a group of southern California egg producers after five years under the national SM scheme. No comparative studies of efficiency of resource use in chickens or turkeys have been discovered.

Therefore, while the evidence that resource use under SM is reduced, that evidence is not unequivocal except in the case of quota values. The inefficiencies indicated by rising quota values in all SM commodities would suggest that SM has not been in urban Canadians' interests. However, measuring efficiency is a complex process, its many facets are not well studied and the precision of understanding about the types and sources of inefficiencies in SM indicate the need for further study.

Adequate representation of urban interests. By statute or convention, at the provincial and federal commodity board or supervisory board level, the overwhelming background of the regulators and interests they understand and represent are those of producers. In the case of fluid milk, urban interests are hardly ever represented in the provincial regulatory

Table 2

Estimates of Aggregate Production Rights Values
Canada, by Province
Various Years

	Fluid Milk 1978[a]	Industrial Milk 1978[a]	Eggs 1980[b]	Chickens 1980[b]	Turkeys 1978[a]
	----------Millions of Dollars----------				
Newfoundland	-	-	2	-	-
Prince Edward Island	1.0	0	1	-	-
Nova Scotia	14.6	0	5	9	1.3
New Brunswick	9.2	0	5	7	1.9
Quebec	171.7	359.8	35	154	31.5
Ontario	98.4	166.1	124	156	26.5
Manitoba	20.6	10.9	13	10	5.8
Saskatchewan	18.9	7.3	4	6	2.7
Alberta	41.0	18.8	8	22	5.8
British Columbia	262.4	46.5	85	77	24.9
Canada	637.8	609.4	282	441	100.4

Total Value Production Rights = $2.1 billions[c]

[a] George Brinkman, Farm Incomes in Canada, Ottawa: Economic Council of Canada and the Institute for Research on Public Policy, 1981.

[b] Peter L. Arcus, Broilers and Eggs, Ottawa: Economic Council of Canada and the Institute for Research on Public Policy, 1981.

[c] Because of the time frame differences of 1978 and 1980 for the quota rights, estimates are different, adding them introduces a bias. Since none of the commodities cited have had declines in quota values below their 1978 values, the aggregate figure underestimates their present nominal values.

agencies. When they are, they are always dominated by producer interests. For industrial milk, controlled by the Canadian Dairy Commission, the backgrounds and loyalties of the members of the Commission and its advisory institutions, e.g., Canadian Milk Supply Management Committee, are overwhelmingly producer (12 and 13). While urban interests may try to have their views and interests represented through petitioning the various regulatory bodies, there is no evidence that those interests are represented on a continuous basis, as are producer interests. Urban interests could be represented at the federal Cabinet level which approves CDC decisions but, because the majority of industrial milk is produced in Quebec and eastern Ontario, where the Liberal Party derives the majority of its Members of Parliament, its decisions on industrial milk have invariably favoured producers at the expense of urban Canadians (12, pp. 39-44 and 5).

There are four regulatory institutions involved in national SM of feathered products, the provincial commodity boards, their provincial regulatory agencies (often called a superboard), the national commodity boards (Canadian Egg-Chicken-Turkey Marketing Agencies), and the national regulatory agency (National Farm Products Marketing Council). Urban interests are unrepresented in the regulatory process for feathered products, save for the occasional "consumer" representative on a provincial superboard, except in National Farm Products Marketing Council. By law, at least 50 percent of the latter's members must be primary producers and, according to my subject evaluation, only two of nine could be considered as representing either the consumer or the public interest (13).

Urban interests have no effective access to any but the NFPMC and there, only infrequently and under highly biased and unfavourable circumstances and conditions (14, pp. 36-37). Because of the backgrounds and biases of the individuals in the regulatory process for SM commodities, even when access is obtained, urban interests have fallen on deaf ears. Had urban interests been effectively represented in the SM schemes, it is impossible to believe the results described above, all negative with respect to urban interests, would have occurred.

Can and How May the System be Changed?

One may well ask why such imbalances in representation occur. The answer lies in a complex mixture of attitudes relating to farms and farming; the ability of farmers to represent their interests to government; the importance of being unimportant (farmers are a much smaller proportion of the population than they were 30 years ago and the nation can afford much larger individual income transfers); that most of the costs of SM are hidden because they are indirect and are, therefore, not subject to parliamentary scrutiny nor public accountability; that parliamentarians have not provided regulatory checks and balances. In fact, we do not even see the problem of regulatory capture (regulators assuming attitudes of regulated through constant exposure) because the system for feathered products starts out with the regulators being elected by the regulatees from among the regulated, by statute; and the list continues, too complex to discuss here.

Most of these matters are discussed in Forbes, Hughes, and Warley (15) and Forbes (12), but the policy process in Canadian food and agriculture has not been widely studies and is not well understood. Although agricultural economists and others have developed methodologies for measuring regulatory costs and their distributional effects, there are two large areas which are poorly studied and understood. The first, mentioned previously, is how to develop food policy and programs which do not lead to the flawed and difficult to change SM activities just described. The second, and closely intertwined problem, is to try to define what we want agricultural intervention and regulation programs to accomplish. The rifle/shotgun analogy is useful here in that programs should have defined goals that direct their benefits like a rifle to a specific group rather than spread unspecific and unnecessary benefits to all producers of a commodity like a shotgun. All this at high cost to urban Canadians, and resulting in an uncompetitive, high cost production environment to future farmers. Ways to influence better regulatory approaches to food programs and to direct benefits to specific groups is a challenge for professionals in the agricultural sector.

Summary and Conclusions

Urban Canadians comprise well over 95 percent of the population whose interests in supply management activities for feathered products and dairy were evaluated on each of five dimensions. It was concluded that food adequacy is a red herring because supply management is a euphemism for supply restriction which the higher prices set by SM regulatory agencies would call forth if production were not restricted. The problem is super abundant supplies. Logically then, urban interests in equilibrium prices or a movement toward equilibrium prices without severe output restrictions have not been served. The excess prices and regulatory costs and transfers for the SM commodities evaluated here are well over $1 billion annually. The one urban benefit from SM is stable prices at elevated levels. But even this is a benefit of questionable value. Efficiency of resource use under SM has probably declined as there is no evidence of increases in efficiency and some evidence of reduced efficiency for SM commodities. Neither do urban Canadians have adequate access, legally by statute nor by convention, to the SM regulatory process, which is completely dominated by producers or regulators whose mind set is highly biased by their background and training towards the producer interest.

Agricultural Economists and Canadian Agriculture--A Final Comment

Is it not time to hold up and publicly proclaim the melancholy results of our researches in the area instead of talking about such things behind academic doors? I am distressed, for example, that in the recent inquiry on eggs, not one member of an agricultural economics faculty made a submission to the National Farm Products Marketing Council with suggestions about how SM might be improved. After almost 10 years of observing,

researching and participating in the SM regulatory process there is no question in my mind that the interests of urban Canadians are harmed by supply management marketing boards as they are presently constituted and regulated. To conclude otherwise begs the question of why producers so strongly and vociferously support them and why informed urban Canadians take the opposite view.

The question is really one of determining the public interest. That determination is a political judgment which, in my view, has favored producers at the expense of urban Canadians because of a faulty policy process, a process which effectively excludes urban interests from consideration in the regulatory process.

Agricultural economists and other members of the Agricultural Institute of Canada have much to offer in the debate and policy process which will set the course of our food system in the future. One hopes that a decade or two from now that the individuals attending this Conference will not have to look back and say to themselves that they should have done more when it really counted.

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DISCUSSION
Paul K. Blakely*

Jim Forbes identifies five urban interests which have been claimed for supply-managed (SM) commodities. They are:

- an adequate food supply of adequate quality;
- fair food prices, defined as proximity to long-term equilibrium levels;
- relatively stable prices around that long-term equilibrium level;
- long-term economic efficiency of resource use;
- confidence that urban interests are being adequately represented.

I would like to make some brief comments on each of the five interests he raises.

Adequate Food Supply of Adequate Quality

Forbes' discussion here indicates that we cannot say that there is an inadequate supply of SM commodities because price serves as the allocative mechanism to clear available supplies. At this juncture he makes no comparison with the competitive equilibrium quantity. Such a position reduces this issue to a red herring, as he says. But I would make two observations with respect to the adequacy of food supply in the supply-managed commodities. First, there is a goal of preserving diversity in Canadian agriculture. During the last two years, according to the USDA, U.S. broiler chicken producers lost money in 10 out of 11 quarters. I suggest to you that without supply management or massive support payments the Canadian chicken industry and chicken processing industry would have been decimated. Second, the SM commodities are part of a commitment to Canada's self-sufficiency goal in agriculture. Although you may scoff at the idea of endorsing some level of North American inefficiency to preserve Canadian agricultural self-sufficiency, one does not have to look too far back in history to witness the selective grain embargoes of Presidents Nixon and Carter. Such embargoes encourage moves toward self-sufficiency. The SM commodities are part of the commitment of adequate food supplies.

Fair Food Prices

They are defined in this paper as "prices that average out at long-term equilibrium levels or regulatory actions resulting in movement toward long-term equilibrium levels.

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To support the contention of excessively high prices Forbes cites the usual arguments of high quota values. But for the sake of discussion, let me suggest some arguments that indicate that many of the articles on quota values overestimate the amount of "excess" return:

1. Reduced risk implies a lower return is required and a consequent bidding up of investment goods in the SM industries occurs;

2. Speculation on quota in and of itself could contribute to high values, independently of actual returns on the supply-managed commodities, i.e., producer returns may be less volatile, but speculation in quota may be subject to cobweb returns;

3. Tax laws allow quota as a depreciable asset, which means a producer's actual payout for quota is less than that indicated;

4. Variation in individual production costs will generate high quota values, but the existence of quota value in such a case is not necessarily inconsistent with long-run equilibrium;

5. Quota value is determined by the difference between marginal cost and average revenue, not between average cost and average revenue the way some authors have measured it. If there is excess capacity in a SM industry, which Forbes suggests, then quota values overstate the excess over an equilibrium condition.

Aside from arguments presented to justify positive quota values, let's admit that perhaps there is some excess above the minimum required to keep a producer in a SM industry. The question of what is a <u>fair</u> price should perhaps not be taken in the naive sense of what is the minimum required to keep some producer in business. I am suggesting that producer returns may exceed some minimum but perhaps it is not a serious problem relative to the perspective that 39.1 percent of the nonagricultural labour force, as of January 1, 1982, is unionized. Show me a unionized labour man and I'll show you a man receiving significant economic rents.

As champions of efficiency, economists may respond that even if we want to enrich a segment of society above a traditionally depressed equilibrium wage, is this the best way to do it? I would argue that the stabilization programs so frequently espoused as a preferable substitute to SM, was not without expensive lone-term consequences. We may perceive this in the very next trough in the hog cycle. On the other side, I would also argue that the benefits of reduced transfer costs of entry and exit, the reduction of social costs, as well as the economic benefits of continuity in supply are items rarely examined in SM literature.

<u>Relative Stability of Prices Around Long-Term Equilibrium</u>

There seems to be some confusion in the literature over the difference between stable prices and stable producer returns. There also seems to

be some acceptance of the former as a proxy for the latter because producer returns are more difficult to obtain. I just mention this in passing because I have no doubt that SM has accomplished the stable return objective.

Long-Term Economic Efficiency of SM Resources

Admittedly this is a problem worthy of concern and study. The lack of competitiveness on a national scale is, I believe, a fertile area for research. We live in a political economy, however, and proposed improvements to the system must recognize this. Some of the types of studies that we at Agriculture Canada are involved in that I wish would be addressed by the academic community include:

1. The implementation of the comparative advantage criterion in allocating overbase quota;

2. Development of a surplus removal program for chicken;

3. The possibility of marginal cost pricing in the expansion of SM industries;

4. A review of egg pricing to breakers.

Oftentimes I see articles critical of a particular problem, but there is no real viable proposed solution. There are a number of improvements to the SM systems that can be addressed by agricultural economists.

Adequate Representation of Urban Interests

Forbes mentions four regulatory institutions involved in national SM of feathered industries. Only provincial boards do not have consumer representation. The national agencies do have consumer representation. But consumers have other forums, which I think even more effectively represent their concerns. Personally, I think Agriculture Canada's position on many policies are more balanced than many outsiders would have you believe. Other government departments, such as Consumer and Corporate Affairs and Finance, also represent consumer interests.

In summary, I couldn't agree more with Forbes' statement that:

> Although agricultural economists and others have developed methodologies for measuring regulatory costs and their distributional effects, there are two large areas which are poorly studied and understood. The first ... the policy process in Canadian food and agriculture ... the second ... is to try and define what we want agricultural intervention and regulation programs to accomplish.

I suggest that there is a rich area of research which would address the question of how to improve the present system within the context of political and economic acceptability.

DISCUSSION
J.S. Campbell*

1. There have been five "urban interests" identified in the paper presented by Dr. Forbes. It is also pointed out that there is some difficulty in differentiating "public interest," "consumer interes+" and "urban interest" in dealing with the issue of Supply Managed Commodities.

There are several general political issues which, perhaps among others, seem to underlie any broad discussion about Supply Managed Commodities.

(a) Policy regarding preferred domestic supply of foodstuffs.
(b) Policy regarding domestic/foreign ownership/control of resource bases, including land and the means of production.
(c) Policy regarding the nature and concentration of Corporate control in disparate Canadian markets.
(d) Policy regarding the status of the 'family farm' and the degree of entrepreneurship and private ownership of farms in particular.
(e) Policy regarding agricultural stabilization.
(f) Policy regarding the acceptable degree of intervention into markets.
(g) Political accountability for policies and interventions.

The urban issues identified could be related to these, as follows:

	Urban	General
A.	Adequacy of supply and quality	Secure domestic supply Domestic/foreign ownership
B.	Fair food prices	Corporate concentration Family farm
C.	Stable prices	Stabilization
D.	Efficiency of resource use	Degree of intervention
E.	Urban representation	Political accountability

2. The development of supply-management systems is not only policy based, but also framed in the Constitution of Canada. Canada is a confederacy, arguably unique amongst the family of federal nations. Canada

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is a union of provinces having the purpose of acting on mutual goals; but which provinces at the same time retain a constitutional and legislative responsibility in defined areas. Particularly relevant is provincial ownership of resources and the power to manage them.

Any pragmatic system, alternative or proposed system for the regulation of agriculture in Canada will consider the body of constitutional law which surrounds this Canadian fact.

3. If some general consensus on policy leads to the decision to intervene into agricultural markets in Canada, then these are options to be considered in determining the appropriate means, some of which follow:

(a) Multilateral or unilateral restrictions on trade, including embargoes, quotas, duties, or the like.
(b) Direct or indirect subsidies; income stabilization; insurance, etc.
(c) State ownership; such as collectives, crown corporations and the like.
(d) Particular interventions, designed to attempt to cope with specific situations; for example, marketing boards, marketing orders, co-ops, and related institutions.
(e) Other types of intervention.

4. The evaluation of the costs and benefits of any specific intervention appears to be a challenging task to agricultural economists. The matter of analyzing supply management systems is of interest in Canada and some recent attempts at analysis have been provided in the paper presented. It is probably fair to say these are controversial and first approximations and remain indicative rather than definitive at this time.

However, the issues are of far reaching consequence to both urban and nonurban interests, and there would probably be general agreement that economic research into cost-benefit analysis of existing and alternative systems be more rigorously and completely undertaken.

FREE INTERPROVINCIAL TRADE OR PROVINCIAL SELF-SUFFICIENCY IN AGRICULTURAL PRODUCTS

Elmer L. Menzie*

Canada has completed an agonizing process of repatriation of the Canadian Constitution. Some of the major arguments among the provincial and federal leaders, with respect to the Constitution, have focused on economic issues regarding the ownership and control of resources and the freedom of economic activity. There are known political, social, cultural and economic advantages to a provincial union of the nature developed in Canada. This was recognized by the Fathers of Confederation and enshrined in the original constitution. Section 121 of the British North America Act states, "All Articles of Growth, Produce, and Manufacture of any one of the Provinces shall, from and after the Union, be admitted free into each of the other Provinces."

The recent constitutional review has confirmed the concept of an economic union with free movement of people, goods and services, but regulation and intervention by both levels of government have created barriers which are contrary to the spirit of the law. Various court rulings on the meaning and intent of Section 121 have left the interpretation vague. A report by the Minister of Justice concludes "...it is certainly doubtful under the existing state of authorities that Section 121 would be interpreted to prohibit non-tariff barriers on goods. The only certainty is that this section prohibits customs duties affecting interprovincial trade in provincial products." (Chretien, p. 19).

Despite the advantages to economic and political union, there are pressures which tend to push the respective provinces toward independence and isolation, particularly in economic activities. Most of the relatively small population of 24 million are settled in a narrow band across the nearly 5,000 mile wide southern frontier of the country. Except for southern Ontario and Quebec, which encompass about one-third of the population, markets tend to be small and scattered. Geographically the natural flows, both of people, and economic activity are north and south. The distances across Canada have provided a significant barrier to interchange between the provinces. For a wide range of commodities, trade is more economical to conduct with the United States than the rest of Canada.

The distance to markets, plus the differences in natural endowments have contributed to the relatively wide disparity in the economic well being of individuals among provinces. An objective of both Federal and Provincial governments to provide greater equity of opportunity and distribution of wealth without requiring the relocation of people has resulted in policies which have tended to offset the normal market directed advantages of the area. In some instances, these policies have focused on

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greater regional self-sufficiency as a means of expanding local opportunities. As these policies have expanded, interprovincial trade plus the flows of capital and people have been affected.

The primary focus of the remainder of this paper will be on barriers to interprovincial trade in agricultural products and policies directed toward greater self-sufficiency of individual provinces.

Current Interprovincial Trade Situation

It is possible to obtain data on production by commodity and province but data on trade flows between provinces are not generally collected. This is unfortunate because it limits the possibility of studying the impact of changing policies on those trade flows. Some limited data on interprovincial trade are available. For example, live turkey shipments between provinces amounted to approximately three million pounds in 1979 and 1980, or about 1.5 percent of production. (Agriculture Canada, Poultry Market Review). Most of these were shipments from British Columbia to Alberta and Saskatchewan to Alberta and Manitoba. About nine million pounds of live chicken were shipped interprovincially in each of 1979 and 1980. Over 50 percent of these shipments were from and to Ontario and Quebec. Estimates of slaughtered and live trade in either turkeys or chickens suggest interprovincial trade probably ranges between 5 and 10 percent of production.

In 1979 and 1980 Saskatchewan, Manitoba and Quebec shipped about 10 million dozen ungraded eggs to other provinces. Over 40 million dozen graded eggs flowed interprovincially. Combined interprovincial shipments of graded and ungraded eggs amount to about 15 percent of production. Nearly all provinces were involved in some shipments, but nearly 50 percent came from Ontario, with 30 percent from Manitoba.

A study on hog marketings, (Gilson) suggests some flows of pork, based on provincial surplus and deficit positions. Quebec, British Columbia and the Maritimes have been traditional deficit provinces. Ontario had a deficit from 1970-78. The three prairie provinces had surpluses in all years from 1960. However, significant changes have been occurring with a substantial drop during the 1970's in prairie hog production and a major expansion in Ontario and Quebec. Quebec reached self-sufficiency in 1977 and has since substantially increased its surpluses. Quebec and Ontario now produce two-thirds of Canada's pork supply.

Nearly 50 percent of the feeder calves are raised in Alberta and Saskatchewan and about one-third in Ontario and Quebec. Much of the interprovincial movement of calves for feeding is from Alberta and Saskatchewan to Ontario. Few slaughter cattle are shipped across provincial boundaries.

Milk shipments for fluid or industrial uses are extremely limited, with most of the trade between Ontario and Quebec. Feed grains are shipped from the prairies to the eastern provinces. Ontario and British Columbia take a major part of the barley shipped interprovincially.

Some fresh fruits and vegetables are shipped interprovincially in season. There is also a significant movement of processed fruits and vegetables with about 60 percent of the production in Ontario. (Shapiro).

The above description is limited in defining interprovincial trade, but does give some indication of the scope in selected major products. While the data lack precision and do not indicate trends, they should be useful as a basis for discussion of policies affecting production and trade flows.

Programs and Policies

There are numerous programs and policies which impact directly or indirectly upon production, consumption and trade in Canada. The primary programs are those intended to improve the position of agricultural producers. Some of these are instituted nationally with an obvious intent to improve the level of all producers' welfare, others, both national and provincial, are focused on improving the relative positions of producers in given regions. Some provincial programs are focused on greater "self-sufficiency" within the province. While most programs affecting trade appear to be producer oriented, there are policies designed to protect consumers, which also have an impact on trade.

1. Producer Marketing Boards, Agencies, or Commissions. There are over 100 provincial marketing boards in Canada, exercising some degree of control in the marketing of about two-thirds of Canada's agricultural production. In addition, there are five national boards or agencies which provide a wider range of control and coordination for selected products.

The Canadian Wheat Board (CWB) was the first national marketing agency for agricultural products established in Canada. Since 1935 the CWB has exercised complete control over the marketing of wheat in Manitoba, Saskatchewan, Alberta, the Peace River District, and Creston-Wynndel areas of British Columbia. The CWB also has controlled oats and barley marketing in western Canada and influences movements of other grains in the region by controlling deliveries. Feed grain movements are also monitored by the Canadian Livestock Feed Board (CLFB) which has administered a system of pricing western feed grains to be competitive with U.S. corn. Although a review of this policy is underway, no changes have been announced. Neither the CWB, nor the CLFB, have direct control over production.

The Canadian Dairy Commission, established in 1966, maintains control over production, pricing, and marketing of industrial milk. Production quotas are set for each province and the Commission determines target prices, makes subsidy payments to producers and establishes levies to cover export costs. Subsidies are provided under the Agricultural Stabilization Act.

A Canadian Egg Marketing Agency (CEMA) was formed in 1972 to co-ordinate national egg production and marketing. Production quotas have been established provincially and prices are set with a cost formula. Provincial price differences "are developed as a result of transportation and marketing costs from a base national average price in Ontario so that eggs will move freely from areas of surplus to areas of deficient supply." (Lane).

The Canadian Turkey Marketing Agency (CTMA) was established in 1973. This Agency has the power to license anyone involved in commercial production and distribution of turkeys in Canada, including control over interprovincial or export trade. It establishes quotas on a provincial basis and fixes prices to producers on a cost formula basis. Minimum transfer prices for turkeys are established for interprovincial sales.

The Canadian Chicken Marketing Agency (CCMA) was established in 1978. The CCMA operates in a manner similar to the CTMA. Quotas have been allocated on a provincial basis and prices are set by a cost of production formula. Interprovincial marketings of chicken are controlled by licenses which are granted only to those "who have regularly been engaged in interprovincial marketing of chicken over the five years preceeding the promulgation of the regulations, and the amount of chicken that may be marketed is further limited to an authorized volume based on that individual's marketing over the same period." (Haack et al., p. 24).

Provincial supply management marketing boards (milk, eggs, turkeys, broilers) operate in conjunction with national boards or agencies. Provincial milk marketing boards also exercise complete control over the production and marketing of fluid milk. Producers are given quotas and prices are established by a cost formula. The processing and distribution of both fluid and industrial milk is likewise under local board control.

The remaining producer marketing boards, with the exception of the Ontario Flue-Cured Tobacco Board, do not operate overt supply management programs. Some boards act as selling agents and bargain for improved producer prices. The Ontario Pork Producers' Board, for example, requires all Ontario hogs to be sold through the Board and operates a teletype auction system to facilitate the process. The three Prairie Provinces and Maritimes also have hog boards which control sales of hogs originating in the respective provinces. The Ontario Vegetable Growers' Marketing Board negotiates minimum prices with processors on a number of vegetables and requires processor licensing.

The primary impact on interprovincial trade comes from the supply management systems. Theoretically, shifts in supply can still occur but in practice the provincially established quotas on milk, eggs, chickens, and turkeys tend to hold production to historic patterns and do not permit

adjustments based on economic advantage. While transfers are technically possible in "poultry marketing plans, reallocations have been relatively minor and reflect provincial negotiating power rather than economic criteria. --- there is an apparent political pressure towards self-sufficiency on a provincial level." (Veeman). As a result, trade between the provinces tends to be very limited and cost differentials are ignored.

The rigidities imposed by maintaining historic production patterns limit the development of new trading patterns. In some cases it obviously reduces trade but it may also force some trade which would not otherwise occur. For example, "An Alberta retailer claimed he is forced to import 60 percent of his total egg requirements from Manitoba and Saskatchewan because Alberta's market share has not increased in proportion to population and economic activity." (Haack, et al., p. 20). Additionally, political pressure may force increases in production quotas in areas where there is population growth regardless of the cost advantages of the area in producing the product.

Quota values attached to production and institutional limits to size affect costs of production and reduce the potential for regional comparative advantage. While it may be argued that quota values are not a direct function of the relative profitability of operations, they do serve as an indicator. The range in quota values among provinces suggests that the difference between product prices and costs varies significantly across the country. Quota values on fluid milk in 1978 ranged from a low of $10 per pound in Prince Edward Island to $150 in British Columbia. (Forbes, et al., p. 108). For eggs, the quota value per bird ranged from five cents in New Brunswick to 63 cents in B.C., and for turkeys from 30 cents per pound in Ontario to $1.52 in B.C. Free movement of product and the rights to produce would be expected to reduce these differentials substantially.

Another indicator of the inflexibility introduced by the system of supply management is illustrated by prices. Producer prices of broilers among provinces differ from three to four cents per pound liveweight. (Agriculture Canada Market Commentary). Certainly greater differences in cost would be expected even though producers in different provinces may be willing to accept lower returns to labor and other resources. The same is true for turkey, egg and milk producers.

An examination of broiler and turkey prices to retailers also suggests market inflexibility and a lack of free flow on an interprovincial basis. In the last two quarters of 1979, Ontario broiler prices to retailers averaged less than 65 cents per pound. During the same two quarters, prices in B.C., Alberta and Saskatchewan averaged from 85 to 90 cents per pound. This difference of 20 to 25 cents in prices to retailers, greatly exceeds transportation costs of less than eight cents per pound between eastern and western Canada. While the differences seemed to have narrowed in 1980 and 1981, Ontario prices were still 16 to 20 cents per pound lower than Alberta or Saskatchewan markets. Retail price differences are less for turkeys, but still well above the apparent costs of transfer.

Fluid milk quotas and marketing regulations prevent interprovincial flows of milk in Canada. Barichello indicates, "These closed and self-sufficient provincial (and, in some cases, intra-provincial) markets do not arise for reasons of fresh milk perishability, because the technology of milk transportation now permits long distance shipments and less perishable fresh milk substitutes are now marketed. These local milk markets are closed because of existing regulations and, whatever their historical origins, they now serve to present competition among different milksheds and balkanize fluid milk production." (Barichello, p. 26).

Marketing boards operating without supply management powers probably have limited affect on interprovincial trade. It is conceivable contracts and forced sales systems, as used by some hog boards, for example, could restrict trade by limiting market access to some buyers. However, most boards have programs to expand sales and thus likely contribute to trade by promotional activities in other provinces. The Canadian Wheat Board system of licensing and allocation of delivery quotas, as well as its method of pricing feed grains, obviously has an impact on grain and livestock movements. This aspect will be discussed further under transportation programs.

2. Agricultural Stabilization Programs. The primary stabilization programs are federally supported. The Agricultural Stabilization Act provides support for prices for nine different commodities. Prices are supported at 90 percent of the most recent five year average adjusted for increases in cash costs in the current year relative to the base period. Provinces are permitted to increase the level of support if they bear the cost. There is also a stabilization plan for western grains. Producers and the federal government contribute to a fund to cover the payment costs which are made when the total revenue from the grains, minus cash costs, is less than 90 percent of the previous five years.

Costs for federal stabilization and crop insurance programs amounted to $154 million in 1980/81. The three prairie provinces, plus Ontario and Quebec, were major recipients with 30 percent going to Saskatchewan. Given the level and distribution of payments, it is questionable whether this form of activity has a significant impact on trade. Undoubtedly, the programs do reduce some of the risk and may, therefore, contribute to some expansion of production.

Federal subsidization of the dairy industry, however, is somewhat different. Payments have been continuous for a number of years and are regionally oriented. The total in 1980/81 was $274 million, of which Quebec received 48 percent and Ontario 32 percent. Seven other provinces received smaller amounts ranging from $2.8 to $17.8 million. It seems evident that the system of industrial milk quotas, the policy of selling butter at the same price in all regions, and the nature of the distribution of dairy subsidies restricts industry adjustment and, therefore, interferes with interprovincial trade.

Provincial stabilization programs have been relatively limited but appear to be growing. Expenditure estimates by province for 1980/81 ranged from $800,000 in New Brunswick to $21 million in Ontario. The nature of the programs makes expenditures highly variable from year to year.

Ontario's Farm Income Stabilization Act, provides price supports for several commodities based on 95 percent of the five year average market price plus a factor for cost inflation. This is a voluntary program with the government covering two-thirds of the fund cost. Quebec's Farm Income Stabilization Plan, which covers nine major commodities, is based on a cost of production formula, including a value for the producer's labour, and the government pays two-thirds of the cost. British Columbia has a Farm Income Assurance Act, with costs shared on a 50:50 basis. The support provided is 100 percent of the cost of production. Other provinces have had varied plans for hog and beef support.

Provincial stabilization programs have a significant potential for distorting production and trade patterns. This is particularly true where programs are on a relatively continuous basis and assure high levels of support based on costs, as in British Columbia and Quebec. Their potential impacts become even greater when combined with other programs such as grants and credit subsidies.

3. Farm Credit Programs. The Federal Government makes credit available under a number of programs, usually at preferred rates. However, the major credit programs considered to have an impact on trade between the provinces is provided on a provincial basis.

British Columbia provides land development loans (maximum of $25,000) at 50 percent of the bank prime rate. Loans from other sources may receive interest rebates equal to about one percent below prime. Alberta provides long-term loans at 12 percent with a 3 percent rebate over the first five years for a maximum of $200,000. Beginning farmers, with less than $350,000 in assets may obtain loans up to $200,000 at 12 percent with a rebate calculated at 6 percent of the original principal for five years. Saskatchewan provides up to $150,000 at 8 percent in the first five years and 10 percent for the next 10 years. The Saskatchewan "Farm Start" program provides $10,000 at 10 percent for five years and 12 percent for the next 10 years. Irrigation loans to $80,000 are made at 6.75 percent.

Manitoba has an interest rate relief program of 4 percent subsidy on $60,000 for five years. Ontario provides tile drainage loans to $60,000 at 8 percent. Quebec has several programs involving interest subsidy. Farm loans are made at 4 percent plus 50 percent of the difference over 4 percent to the bank rate. New Brunswick provides 3 percent interest rebates and for beginning farmers interest may be waived the first two years. Nova Scotia provides $150,000 for farm loans at 10 percent with the next $150,000 at 13 percent. New farmers may pay no interest the first two years. Newfoundland has land development loans to $30,000 at 8 percent and six month swine production loans at the same rate.

While all provinces have some form of interest subsidy or rebate program the levels of assistance vary significantly. Thus these programs provide some basis for changing the location of production by shifting advantages. For example, provincial loans of up to $200,000 with interest subsidies amounting to 8 percent, result in savings of $16,000 per year. For a 100 sow operation this is approximately $10 per pig weaned. Such programs obviously provide a stimulus to production.

4. Special Grants and Production Subsidy Programs. Federal capital grants have been made over a number of years to aid development in selected areas of Canada through the Department of Regional Economic Expansion. Contracts have generally been made on a shared cost basis except for the Maritimes, Quebec and Manitoba where the federal share has been somewhat higher. Total federal expenditures from 1969/70 to 1979/80 were $4.7 billion with $629.8 million in 1980/81. (DREE). Expenditures in 1980/81 ranged from $4.03 per capita in Ontario to $265 in Prince Edward Island. Estimates of total program expenditures on agricultural projects per farm ranged from $58 in Ontario to $13,065 in Newfoundland. Highest per farm expenditures were in British Columbia, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland, all exceeding $1,700. (Menzie).

Each province also has a number of grant and production subsidy programs. At the present time B.C., Quebec and Ontario all have incentive programs to develop asparagus. Ontario and Quebec both have subsidies for orchard development and sizeable programs for farm property tax rebates. Other provinces have relatively small grants for irrigation, seed cleaning, storage, processing, etc.

The various grant and production subsidy programs have an impact on the relative competitiveness of those receiving the aid. Federal grants are intended to provide regional development in poorer areas. The differential rates of investment by province and region are providing advantages to some areas relative to others. Where these are combined with large provincial expenditures the distortions could be significant.

5. Transportation Policies. A number of government programs impact on transportation, but the most widely known program is the Crow's Nest Pass Agreement of 1897. Rates were established by law and reenacted by the 1925 Railway Act, which have continued in effect for grain and grain products moving from all points in the Prairies to export positions in Canada. In 1981 these rates were considered to cover less than 25 percent of costs. As a consequence there have been federal subsidies to buy equipment and repair the system, but deterioration has occurred resulting in poorer service.

The impacts of the "Crow Rate" policy are complex. Arguments have been made that the level of service has resulted in significant losses of exports, primarily of wheat. However, the impacts of the policy have undoubtedly caused feed grain prices to be somewhat higher in the prairie

area, thus acting as a disincentive to livestock production. One estimate suggested the long run expansion of hogs and beef without the rate subsidy would be 12 to 14 percent. (Harvey 1981). Expansion would also be encouraged in the processing of livestock, rapeseed and some other grains as raw product transport costs rise.[1] Thus the "Crow Rate" is considered to have a negative impact on the movement of livestock from the prairie but a mixed impact on grains since the reduced services tend to negate some of the positive impact of the lower charges. Also, land prices are probably higher through capitalization of some of the gains from the rate subsidy.

Another major transportation program has been the feed freight assistance to British Columbia, the Maritimes and eastern Quebec. This has amounted to as much as 5 to 6 percent of feed costs in these regions. Based on hog production, the subsidy would amount to 3 to 4 percent cost saving. In the short run, at least, the subsidy biases production slightly toward these areas.

Transportation subsidies under the Maritimes Freight Rates Act and the Atlantic Region Freight Assistance Act reduce rates by 20 percent for shipments originating in the Maritime provinces. "In April 1974 selective assistance for specified commodities moving by railway or highway transport to points in Canada outside the territories was authorized at levels of 50 percent of that portion of the freight rate earned within the particular territory." (Statistics Canada, p. 628).

Historically there have been some restraints to free movement between provinces, particularly by truck, resulting from regulations, licensing, etc. However, nine provinces have entered a reciprocal agreement with respect to licensing and registration. (Canadian Conference of Motor Transport Administrators). The completion of this agreement should eliminate most of the difficulties from interprovincial truck movement.

6. Miscellaneous Programs. There are numerous other governmental programs and policies which directly or indirectly affect production and product movement. Health and sanitation regulations intended to protect both producers and consumers from disease and other problems do affect product movement. Differing product standards may impede trade and of course have the potential for use as a tool to deliberately restrict flows via official sanction.

Probably a greater significance to interprovincial trade are the policies of government to buy provincially and to promote local products. "Provincial food and agricultural promotion programs exist in all provinces or regions to various extents and clearly manifest the current

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[1] A recent analysis by Harvey estimates the western grain and livestock sector and agricultural processing would each gain by $200 million if compensatory rates were charged. (Harvey 1982).

emphasis in self-sufficiency." (Haack, p. 43). Several provinces give explicit preferences to local buying even allowing premiums as high as 10 percent for local suppliers. Most provinces have promotion programs aimed at reducing imports from other countries but emphasizing the use of local products.

Policies with respect to the sale and distribution of alcoholic beverages tend to be openly discriminating. The Ontario Liquor Control Board has a 45 percent markup on Ontario wines versus 85 percent for other Canadian wines. Additionally wines from other provinces are charged a 25 cent per bottle handling charge. Wineries in Ontario are required to use Ontario grown grapes, cherries or apples, except when local supplies are scarce. Distribution practices also discriminate against imports. For example, Ontario wineries are permitted to establish retail outlets to sell their own wine. Imported wines must be sold through the government liquor board stores and are subject to further discrimination in the practices of these stores.

British Columbia and Quebec also have discriminatory handling and pricing policies. British Columbia wineries are limited with respect to the import of raw product. The retail markup is 46 percent for B.C. wines and 100 percent for imports, Canadian or foreign.

Provincial regulations are also very restrictive with respect to the sale of beer. Only breweries that produce beer in Ontario can belong to the distributing company which has almost exclusive rights on beer sales in the province. "Apparently, beer from other Canadian provinces can be sold in Ontario only when it is 'imported' by one of the companies that own Brewers' Warehousing." (Stegmann, p. 74). In Ontario the markup applied to local beer is 20 percent versus 80 percent for imports. Other provinces have similar restrictive markups and distribution practices. "The Canadian Brewers' Association estimates that 98 percent of beer sold is brewed in the province of sale, with 2 percent moving interprovincially." (Haack, p. 46).

The federal feed grains pricing program also has impacts on product movements. Western feed grains have been priced on a formula to be competitive with corn delivered to Montreal. This undoubtedly has caused some barley to be used in eastern markets as a substitute for corn but is not considered to have a significant impact on feeding. The results in western markets are more complex. When barley prices are depressed by the pricing formula, feeding is favored but there is a disincentive to produce barley. It is, therefore, difficult to determine the ultimate impacts of the policy on interprovincial trade and quantitative measures are not available.

Government Program Expenditures

Expenditures by federal and combined provincial agriculture departments in 1980-81 were approximately the same magnitude at $881.5 and $873.5 million respectively (Table 1). However, federal expenditures for agricultural programs by other departments or agencies added another $593.2 million to make a total of $1.47 billion.

The expenditure patterns by provinces further supports the hypothesis that policies are being implemented to significantly shift the economic advantages of some regions relative to others, which in turn affects inter-provincial trade. There is a wide distribution in levels of expenditure when calculated on a per farm basis in both federal and provincial spending. Federal expenditures ranged from $1,243 per farm in Saskatchewan to $5,626 in Prince Edward Island. Quebec and the four eastern provinces all had higher expenditures per farm. However, a major share of the unallocatable transportation expenditure would go to the three prairie provinces which would probably double the estimates as shown by the Agriculture Department. (Agriculture Canada, unpublished data).

Provincial expenditures on a per farm basis are also widely distributed. They ranged from a low of $880 per farm in Saskatchewan to a high of $11,237 in Newfoundland. British Columbia, New Brunswick, Nova Scotia, Quebec and Newfoundland all had expenditure rates above the other provinces at a level exceeding the equivalent of $3,000 per farm. Combined provincial and federal expenditures ranged from $2,109 per farm in Saskatchewan to $16,789 in Newfoundland. Expenditures in five provinces exceeded $7,400 per farm.

The three major programs involving subsidies to farmers, the crop insurance and stabilization programs, dairy programs and farm credit, were estimated to have taken 26 percent of provincial agriculture expenditures and 50 percent of the federal. Provincial crop insurance and stabilization payments were highest in British Columbia at $694 per farm. Credit costs in British Columbia and Quebec at $1,359 and $1,742 per farm, respectively, were significantly higher than any of the other provinces. Federal crop insurance and stabilization payments ranged from $119 per farm in British Columbia to $856 in Prince Edward Island. The dairy program took over 30 percent of all federal expenditures of which 80 percent went to Ontario and Quebec. The federal dairy subsidy was equivalent to $2,731, $1,075 and $1,522 per farm respectively in Quebec, Ontario and Prince Edward Island.

Some of the provinces had significant programs other than the three major ones. For example, the Ontario tax rebate program in 1980-81 amounted to $49.6 million or the equivalent of about $601 per farm. Ontario also has a major drainage program involving grants as well as subsidized credit. Provincial governments place varying amounts into the grants program under the federal regional economic expansion program.

Table 1

Levels of Federal and Provincial Agriculture Department Expenditures in Agriculture,[a] by Province 1980-81

	Federal		Provincial		Federal & Provincial	
	Total Millions	Per Farm	Total Millions	Per Farm	Total Millions	Per Farm
British Columbia	$ 43.1	$2,154.-	$ 60.6	$3,028.-	$103.7	$5,182.-
Alberta	88.1	1,517.-	139.2	2,398.-	227.3	3,915.-
Saskatchewan	83.7	1,243.-	59.3	880.-	142.8	2,109.-
Manitoba	58.4	1,984.-	42.5	1,444.-	100.9	3,427.-
Ontario	192.1	2,330.-	188.0	2,280.-	380.1	4,610.-
Quebec	218.7	4,542.-	329.4	6,841.-	548.1	11,384.-
New Brunswick	15.4	3,790.-	15.0	3,692.-	30.4	7,482.-
Nova Scotia	14.6	2,894.-	23.3	4,618.-	37.9	7,512.-
Prince Edward Island	16.7	5,294.-	8.6	2,727.-	25.3	8,022.-
Newfoundland	3.82	5,626.-	7.63	11,237	11.4	16,789
Total	881.5[b]	2,769.-	873.5	2,744.-	1,755.-	5,513.-

[a]Other Federal Expenditures in Agriculture include (a) Livestock and Feed Board - $15.4 million; (b) Regional Economics Expansion - $155.4 million; (c) Employment and Immigration - $3.7 million; (d) Industry, Trade and Commerce (Grain and Oilseed Programs) - $111.2 million; (e) Transport (Grain Transportation) - $307. million.

[b]Provincial totals do not equal this amount due to unallocated charges largely associated with the "National Capital" activities.

Source: Unpublished Data from Agriculture Canada.

Federal grants under DREE also tend to be unequally distributed. The amounts on a per farm basis were much higher in the Maritimes, including Newfoundland. The same is true of the grain transportation subsidies which are spent primarily in the prairie area and amount to over 20 percent of all federal expenditures in agriculture.

Summary

Agricultural trade between the Canadian provinces is influenced by a mix of regulations and intervention. Information on trade flows is inadequate, however, to provide a basis for analysis and conclusions relative to changes in marketing patterns because of special programs and policies.

There is evidence that a number of policies and programs do affect production and marketing patterns and they have been increasing in importance in the past decade. Richter, commenting on Canada's trading policies states, "It is a lament that we have violated the principles implied in economics of trade. At the international level this departure from economic behavior and general welfare principles is less pronounced than the damage we do to ourselves by violating the principles of general welfare in our own country. This is most obvious in the case of agriculture. We are in such a net of interventions imposed by federal and provincial governments that we don't even try anymore to extricate ourselves." (Richter, p. 7).

Federal programs and policies probably have the greatest impact on trade. The national quota systems on production of chicken, turkeys, and eggs have instituted considerable rigidity in production. Since they tend to be oriented toward provincial self-sufficiency they reduce the shifts in production associated with regionally changing comparative advantage and thus reduce or stagnate interprovincial flows. Price disparities among markets for these commodities suggest normal product flows are being impeded even within the framework of the production patterns established.

National dairy quota and subsidy patterns have locked in and maintained historic production patterns on manufactured milk. Ontario and Quebec continue to be the major producing regions with Quebec receiving nearly 50 percent of the dairy subsidy. Fluid milk markets are even more rigidly maintained by provincial milk board authorities which virtually eliminate the possibility of interprovincial fluid milk sales.

Transportation regulation and subsidy payments also provide a major influence on interprovincial trade. Higher rail rates for western grains would likely cause a reorientation of Canadian livestock production and product processing. Higher transportation costs would result in fewer calves and less grain being shipped from the prairies to other provinces for feeding, while shipments of finished meat and other products would increase.

Federal regional development programs also provide some distorting impacts on trade. Certain types of production in selected areas receive advantages not available elsewhere. In some cases the impact may be on imports from outside the country, but in general other domestic producers likely face some market loss.

While the greatest impacts on interprovincial trade appear to come from federal programs, the major impetus for provincial balkanization comes from the provinces. Provincial programs tend to focus on self-sufficiency and are geared to provide local producers with an advantage. This is evident in the provincial advertising and promotion programs as well as provincial buying policies. It is also evident in the various producer assistance programs. British Columbia, Quebec and three eastern provinces have relatively rich programs with heavy expenditures on stabilization, income assurance, credit and various types of grants.

The pressure for maintenance of quotas on the supply managed commodities comes from provincial pressures to maintain market shares. Trade in wine and beer is severely restricted by provincial government monopoly practices in both pricing and merchandising. Inconsistencies in labeling, packaging, grading and inspection procedures have provided some restraints to interprovincial trade.

Conclusions

There are numerous distortions to the operation of a completely integrated economy in Canada and barriers to the operation of an economic union are growing. The greatest barrier is the institution of a market sharing system among the provinces, which has been sanctioned for expansion by federal spokesmen for the Department of Agriculture. In addition, provincial programs aimed at developing greater self-sufficiency have significant potential for distortion of interprovincial trade patterns.

While this paper has reviewed a number of programs and policies which affect interprovincial trade, it is evident considerable work still needs to be done to assess the impacts. For example, necessary information regarding the flows of products and resources among provinces is presently inadequate. A reasonable inventory of regulations is being developed, but the affects of programs that allocate market shares amongst regions and individuals require further analysis. The real costs and benefits and the long run impacts on resource use and income distribution remain largely unknown. Additionally, what will be the consequences for Canadian society and the economic union if each province pursues programs, aimed at greater self-sufficiency, to the limit of respective budgets? It even seems questionable whether or not the objectives of various policies affecting interprovincial trade have been clearly defined.

Policies affecting the economic union have high stakes. Surely they warrant a more cautious approach and the development of a better understanding of the consequences before further strides are taken in their expansion. Investigation of the nature of the waters ahead may help eliminate the need for a future salvage operation.

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DISCUSSION

G.A. MacEachern*

The topic "Free Interprovincial Trade or Provincial Self-Sufficiency" is certainly a broad and provocative one. The two propositions are not really choices. The question of free interprovincial trade does not appear to be at issue, i.e, is not threatened by a breakdown in interprovincial trade or by the new Constitution. The question being addressed appears to be--What are the present and potential distortions to interprovincial agricultural trade patterns (and associated costs) from interventions in agricultural product and factor markets?

Professor Menzie is to be congratulated for the painstaking effort in preparing a background paper to that issue. The paper deals briefly with the broad policy context so important to a perspective and analysis of the problem. This is followed by identification of specific policies and programs impacting or with potential impacts on regional (provincial) agricultural production, consumption and interprovincial trade.

The analysis suggests that federal and provincial interventions are substantial and create distortions between various commodities and between provinces, at least in agricultural production, and quite possibly in

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interprovincial agricultural trade. The paper concludes with a plea for greater support to policy research and analysis on these agricultural issues which are clearly in evidence and worthy of strong support.

My brief comments are primarily directed to this whole policy research question and outline some considerations for agri-food policy researchers to enhance their effectiveness, including shifts in research direction on this broad topic.

General Comments

1. Provincial Self-Sufficiency. Concerns have been raised by a number of authors and in Agriculture Canada's agri-food strategy paper about the threat this poses to Canada and the agri-food industry in this country.[1] I do not harbour these concerns to the same degree but it would be useful to know what the actual distortions or impacts are to sound agri-food industry development across this country as input to help formulate a better integrated mix of policies and programs.

There is no doubt that the term "self-sufficiency" has had considerable prominence in articulating national policy and still does, e.g., energy self-sufficiency. Fears that this will be further emulated at the provincial level in agri-food development may be valid but to date the term has been mainly used to articulate aggregate agri-food development targets. It is frequently used innocently along with, or instead of, "import substitution" to describe a market-oriented target and has great utility to politicians, industry officials, the public, or even agricultural economists, in providing a practical vision of an aggregate target achievable by sound development policies and providing substantial benefits to all participants. The term can lose its innocence if it becomes a goal or policy itself and this prospect is worrisome. There is a need for a practical substitute for the word "self-sufficiency" in describing area development targets as well as a need to address the underlying sources and causes of potential agricultural balkanization.

2. Static Economic Analysis. I see little promise from using a static economic analysis framework in addressing the problem of intervention. Such models and analysis, e.g., the interregional competition model, can mostly serve only as partial models and analysis for policy research in this area. To enhance credibility and relevancy, policy research models cannot be static and historic, but need to recognize the dynamic development content of policy decision-making.

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[1] See for example, M.M. Veeman, "Self-Sufficiency: At What Cost and at Whose Cost?" op. cit., J.J. Richter, "Comparative Advantage and Economics of Trade." op. cit., and E.L. Menzie, "Interprovincial Barriers to Trade in Agricultural Products." op. cit.

The development context is important as most provinces have and continue to be vitally interested in agri-food development and this belatedly appears to be the federal interest as well. In viewing alternatives, the development context offers much hope for improvements. I doubt if there is any politician, government, or industry official who is not vitally interested in ensuring that any public or private investment in agri-food industry development is sustainable on a sound commercial basis. The problem historically and currently is in sorting out what is a potentially sound investment over the life of the project. What are the givens, the short-term distortions, what is the competitive and comparative advantage potential, e.g., shadow prices, and what changes are needed to reflect sound commercial development potentials?

3. Comparative Advantage. This term is increasingly prominent and occupies a status approaching motherhood. It is not well understood, seldom defined and has little utility to policy decision-makers even though it has been adopted as the basic principle or criterion for quota allocation in national supply management schemes and is the guiding principle espoused for agricultural development decision-making regionally and Canada-wide in Agriculture Canada agri-food strategy. The basic problem is that there is no common understanding of what comparative advantage means even by agricultural economists.

More importantly, little professional effort has been extended to date to develop operational definitions and practical measurements useful in decision-making. For example, it is not uncommon to hear comparative advantage referred to solely in terms of farm production cost advantages ignoring processing, transportation and distribution costs in supplying specific markets. Product perishability factors and the dynamics of comparative advantage are frequently ignored. From a development decision-making context, potential comparative advantage and the dynamics of changes are as important, or even more so, than current comparative cost-market advantage. When addressing operational definitions and measurement one comes face to face with difficult conceptual and empirical problems in dealing with international, national, provincial and local policy and program effects, and some distortions that must be considered givens in decision making. I interpret the paper as appealing for this type of work in order to measure distortions operating in the Canadian agri-food economy. Even though present knowledge suggests possible distortions to sound commercial agri-food industry development in this country, it might be prudent to consider the ouside chance that some interventions may be offsetting other distortions producing a dynamic development equilibrium in some instances.

Specific Points

1. Interprovincial Agricultural Trade Flows. More accurate interprovincial trade information is required both for agricultural commodities, primary and secondary processed food products. This information is of increasing importance not only in analyzing interprovincial trade but in

providing estimates of regional consumption patterns for development planning and policy purposes, particularly in light of the rapid shifts occurring in regional market growth and comparative advantages.

2. Transportation Policy. This area has to be given a higher priority research status, particularly in efforts to analyze changing interprovincial and international trade patterns and for agri-food industry development generally. A number of important transportation policies were listed. Others, such as "at-an-east" rates, and the rate structures themselves, are important. This whole area has received little research attention and yet it is critically important to the topic at hand and agri-food policy generally.

3. Producer Marketing Boards, Agencies and Commissions. There appear to be real opportunities for agricultural economists to address and help resolve a number of problems cropping up in this area. The overbase quota allocation problem is a serious one. The need is for a practical mechanism for measuring interprovincial comparative advantage in industrial milk, eggs, chicken and turkeys. I would suggest, however, that the results of such efforts are likely to indicate a reverse conclusion to that of Professor Menzie; that the current problem is one of political pressures by surplus-producing provinces to maintain earlier shares of production which are now not consistent with comparative advantage criteria, rather than political pressure toward self-sufficiency, i.e., forced, disorderly trade rather than trade restrictions have resulted. If data on processed products were included with the interprovincial trade figures for agricultural products, the trade figures would be significantly greater. Some attention might be warranted to evolving institutional trade constraints associated with producer vertical integration and a locally-oriented marketing distribution system limiting market access to out-of-province product.

Federal and Provincial Agricultural Programs

There is general agreement that considerable disorder exists in this difficult area. A well integrated set of equitable and effective agricultural stabilization and credit programs is lacking and the problem goes back a long way. It appears convenient for some interests to view provincial interventions as evil impediments in the design and delivery of improved national programs. Federal programs historically have been selective with differential impacts regionally and by commodity. Dairy and western grain appear to have done much better than some others. Agricultural Stabilization Act programs are criticized as not providing effective support, recognizing differing regional conditions, unpredictable and unstable themselves, poorly understood by farmers, and of little help in assisting farm management planning for unstable market contingencies. Provincial stabilization and credit programs have to some degree been experimental attempts to fill some of the obvious voids and to facilitate important agricultural development priorities. Clearly a need exists for closer federal-provincial and industry co-operation in the design and delivery of better integrated programs in these areas. Despite

some recent efforts in this direction, the prospect of achieving integrated programs through the joint participation of federal and provincial governments and producers is not promising as a result of an apparent federal government intent to reduce participation in shared-cost programs and more direct participation.

In terms of policy research in this area, a note of caution... When focusing on distorting effects of interventions, better recognition might be given to the specifics of each program, the intercommodity, as well as interregional impacts. I would draw attention to the need to consider the full range of interventions on product and factor markets, e.g., trade and tax policy, and interventions impacting on the labour, land and capital markets have considerable impacts between areas and even between farmers.

It would be helpful not just to consider distortions but to assess the economic efficiency of various programs in terms of development objectives, e.g., the efficiency of various stabilization programs in reflecting appropriate shadow prices and in achieving agriculture-food expansion.

Reference is made to the interprovincial trade significance of provincial promotion of local food products and that this clearly manifests the current emphasis to self-sufficiency. Again it is important to recognize that the major focus for provincial market development programs is in facilitating local agri-food industry development by assisting in gaining market access, initial establishment of a marketing system for local products and development of local food markets.

The interesting table of government expenditures on agriculture indicates that annual expenditures are of sufficient scale to warrant close scrutiny as to efficiency and effectiveness in achieving development objectives. At a time of public financial constraint, it is becoming increasingly important that sound public investment takes place and in such a way that does not reduce the benefits of a national market for agri-food products. Even though there are differences in expenditure levels per farm, it is not evident from the table that "policies are being implemented to significantly shift the economic advantages of some regions relative to others which in turn affects interprovincial trade." The expenditure data appears too aggregative to allow testing of a number of interesting hypotheses.

Summary

The issues raised in the paper are important ones and are more appropriately addressed in the context of agri-food industry development strategy. Static economic analysis provides only limited input to sound policy analysis and decision-making.

The need for and importance of "good" relevant policy research and analysis involving a co-operative, participating approach by federal and provincial governments, agricultural industry officials and researchers

is clearly in evidence. Coupled with this is the companion need for improved federal, provincial and agri-food industry relations, much improved consultation and co-operation in integrating efforts, policies and programs. It is equally clear that new creative mechanisms and attitudes are required in dealing with many of these issues. A better appreciation of mechanisms and approaches being used in other countries and other forums (e.g., ECC regional development policies, GATT mechanisms to address trade and subsidy, etc.) may be a valuable area for policy researchers to pursue.

DISCUSSION

B.H. Davey*

Professor Menzie has provided us with a useful overview of the way in which government policies and programs act as barriers to interprovincial trade in agricultural products and distort the efficient allocation of resources between the provinces and regions of Canada. That I find myself in general agreement with the thrust of his paper is hardly surprising since it seems to me--as to many agricultural economists--that balkanization of the agricultural economy is both a major constraint to the full realization of the industry's potential and a challenge to agricultural policy makers.

As Professor Menzie points out, interprovincial movement of agricultural products is impeded by many policies and programs, including historically-based, market-sharing arrangements under national supply management programs, provincial procurement and promotional programs and liquor licensing arrangements, while other policies such as credit and stabilization programs, transportation subsidies, etc. often give one province or region of the country a competitive advantage over the others.

These problems are well recognized by policy makers. For example, the federal government's Agri-Food Strategy states that "Improvements need to be sought in the operation of marketing boards. They must be encouraged to give greater attention to market performance and expansion." This refers, I assume, to the national marketing agencies under federal jurisdiction. (It is somewhat ironic to recall, in passing, that these agencies were established, at least in part, in response to interprovincial trade problems, such as the so-called chicken and egg wars!) The strategy also refers to assistance programs which give producers in one province an unfair advantage over their competitors in other provinces; it goes on to indicate that "An Agri-Food Strategy needs to contain a strong federal leadership with even-handed policies to ensure that production develops where it enjoys the greatest comparative advantage."

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However, it is one thing to identify the problem and quite another to take action to resolve it. Here I must take issue with the statement in the paper, attributed to Professor Richter, that "We are in such a net of interventions imposed by federal and provincial governments that we don't even try any more to extricate ourselves." My point is that while there may not have been many successes, at least the attempt has been made; let me illustrate this argument with a few examples:

1. First, over the last decade there have been several attempts to negotiate national, harmonized stabilization programs. Depending on one's point of view, these attempts have failed either because of the parsimony of the federal government or because some provinces were unwilling--or unable--to relinquish their own programs.

2. Second, the Federal Minister of Agriculture has announced that in future all provincial stabilization and income assurance payments will be deducted from the federal payment. This is a direct response to the concern about varying levels of provincial stabilization payments and their effect on the competitive position of farmers in different provinces.

3. Third, one may not be too far away from the day when the Crow rate issue is resolved in a way which removes--or at least substantially reduces--the resource distortion inherent in the statutory rates so that the prairie provinces will be better equipped to exploit their natural advantage in livestock feeding, meat packing, oilseed crushing and feed milling.

What I think has to be recognized is that there are important political considerations in play so far as interprovincial trade barriers and agricultural assistance programs are concerned. While it behooves the economist to provide the policy maker with rigorous analysis of the economic costs of present policies and programs and of the implications of alternative approaches, it also requires the political will on the part of the policy maker to make the changes which are being urged on him by economists and others.

Notwithstanding the recognition of the problem, there may well be increasing rather than less pressure towards balkanization of the agricultural economy and greater barriers to interprovincial trade. As Professor Menzie has pointed out, there is the possibility of more supply management in agriculture. The attraction to policy makers of this option of addressing farm price problems is obvious at a time when money is hard to find for improved stabilization programs--the costs of the latter are highly visible while the costs of the former are hidden (but substantial). There is also a potential and major issue in the area of product standards in light of the Labatt's case, in which the Supreme Court of Canada declared ultra vires all nonhealth-related food standards imposed by the federal government. Unless all the provinces legislate complementary standards for intra-provincial trade, barriers to interprovincial trade will increase.

Let me conclude my comments by noting that the issue we are discussing is by no means confined to Canada. You will forgive me if I retreat across the Atlantic and remind you of the problems of the European Community and its Common Agricultural Policy. As the recent example of the Anglo-French "lamb war" illustrates, Canada is not alone in its failure to garner the full benefits of economic union. Free intra-community trade in agricultural products has remained an elusive goal in the EEC and the national governments continue to offer a variety of support and assistance programs for their producers. There is perhaps an analogy with the new highway development which is great so long as it stays away from my property--similarly free interprovincial or intra-community, or even international, trade in agricultural products is fine so long as it does not harm my own self interest. In each case, unless there is a major change of attitude or philosophy--in particular a willingness to put existing policies and programs on the bargaining table--the outcome will be that economic integration and a more efficient allocation of resources will be difficult, if not impossible, to achieve.

MICRO-COMPUTERS IN AGRICULTURE*

Chairman: Win Stokes**

USING THE MICRO-COMPUTER TO HELP FARMERS LEARN FARM MANAGEMENT CONCEPTS AND TECHNIQUES

Lorne Owen***

Introduction

The micro-computer is a relatively new innovation that has received considerable interest from farmers, extension specialists, educators, and researchers over the last several years. An evaluation of micro-computers as an extension aid initiated by Alberta Agriculture's Economic Services Division demonstrates that the micro-computer is a practical and beneficial resource for extension specialists. Micro-computers can help extension specialists to:

1. Reduce the time required to collect, process and disseminate economic and financial information through on-site data processing--using a tool that is both relatively inexpensive and easy to adopt.

2. Increase the effectiveness of extension presentation by increasing audience attention and participation, by providing an electronic blackboard allowing the instantaneous modification of examples to reflect audience concerns, and by providing an additional communication channel--allowing specialists to create and capitalize on a "teachable moment."

3. Carry out many of the laborious unsophisticated calculations involved in farm management with considerably less time and expense than would otherwise be required for these calculations on a hand calculator or on a mainframe computer.

The unique characteristics of a micro-computer--portability and self-contained data processing--give it an advantage over other methods of data-processing for many extension applications. While the micro-computer will neither replace hand calculators nor mainframe computers

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in many applications, it does effectively fill the data-processing gap left between the hand calculator and the mainframe computer.

The evaluation of micro-computers as an agricultural extension aid was initiated in Alberta when the Economic Services Division of Alberta Agriculture purchased three micro-computers in 1979. In 1981 Alberta Agriculture Planning and Communications Task Force group purchased an additional 13 micro-computers. One of the initial evaluation projects was located in the Calgary Regional Office and when I took the position of Regional Economist I was given both the project and the micro-computer. Initially I viewed the micro-computer with a certain amount of apprehension and pessimism: the micro was new and as with any new tool there is a certain amount of misunderstanding. But the responsibility and the potential benefits of inexpensive on-site data-processing provided the incentive to learn more about the micro and to experiment with its uses. Gradually, I became familiar with the operation of the micro and at the same time some very useful hardware and software became available.

Two developments that have greatly enhanced the micro's extension potential and ease of use are the visi-calc/super-calc worksheet software and the E.D.P. 56 monitor/projector. Over the last year the micro-computer was included in over 30 extension events in the Calgary region. These events encompassed a wide range of extension activities including seminars and courses, applied research and data collection meetings, farm advisement sessions as well as professional updating and communication activities. This wide range of uses provided an excellent opportunity to observe and evaluate the use of a micro-computer as an extension tool.

In the following I would like to relate my experiences using computers to help farmers learn farm management concepts, some observations on the advantages and disadvantages of micro-computers, and some predictions with respect to the future extension applications of micro-computers.

Background

The use of computers to teach farm management concepts is not a new innovation. Since the early 1960's, educators at colleges and universities have incorporated mainframe computers in their courses to teach students the various skills and concepts used in the management process. Computers have been included to illustrate the concepts and techniques involved in data collection, data analysis, decision making, and project evaluations; concepts such as probability, marginal cost, elasticity, and present value, and techniques such as partial budgeting and cash flow analysis. The computer allowed educators to eliminate, at their discretion, the laborious, repetitive calculations involved in the analysis of input-output, input-input, and output-output

relationships. Over time programmed learning courses, farm management games, simulations, and problem solving programs have been developed. Over the past decade the computer has provided many advantages in teaching college farm management courses.

Given the education advantages that computers could offer, farm management extension specialists optimistically tried to use mainframe computers in extension programs. Unfortunately these efforts usually resulted in a minimum amount of success and a maximum amount of frustration; the direct result of problems encountered when trying to work with portable terminals from remote locations with canned programs, and working with the complex bureaucracies that surround mainframe computers. I will briefly review some of the problems encountered with trying to use a mainframe computer in a field extension program to help illustrate the benefits of micro-computers. Those of us who have tried to use mainframe computers at a rural location will be familiar with some or all of the following problems:

1. Rural telephone equipment is not designed to transmit data; thus many transmission errors occur.

2. Telephone systems are not designed for sustained data transmission (electrical storms, line noise, etc., interrupt data transmission).

3. .Input-output and editing routines tend to be slow and cumbersome.

4. It is difficult to modify canned programs to reflect local situations.

5. It is difficult to add simple programs or re-program (even simple programs tend to take one week to get on a system and changes take several weeks by the time one gets through the necessary channels).

6. The buildings in which we hold extension programs are not designed to accommodate a telephone hookup from a computer to a visual display (the pay phone at the Buffalo Hall is on the pole outside and it is not very practical to rerun a line for every event you would like to use a computer at).

7. Mainframe computers tend to crash, and when they do it is difficult to explain to a group what happened. To explain what the computer could have done, lacks educational impact.

8. Rural power supplies tend to be uneven and this disrupts data processing.

9. Farmers tend to be somewhat skeptical of a complicated system and results that have been calculated by an unseen machine.

10. Party lines eliminate the possibility of on-farm use.

11. Mainframe processing time is expensive when calculating alternative plans.

I do not want to leave you with the impression that all of these problems are solved with a micro-computer; but the number of problems experienced is greatly reduced. Several of the previously listed problems could be solved through design changes and re-programming but I am not sure that this is a cost-effective alternative.

Extension Uses of a Micro-Computer In the Calgary Region

Over the last year, several of my colleagues and I have used a micro-computer in the extension programs that we offered. The unique characteristics of a micro lend themselves to a wide variety of extension applications. The micro can be used for the preparation and presentation of: half-day extension seminars and multi-day extension courses, in applied research activities, for advisement and counselling, and to assist with professional updating and communication. While the micro has been used in a wide variety of extension applications, only a small portion of its potential has been developed.

In the following I would like to relate some of the experiences that we have had over the last year using micros at extension events.

1. Presentation and preparation of extension seminars. With respect to extension seminars, a micro has two applications. First, it can be used as an education aid. As an education aid it provides another channel of communication such as an overhead, and allows the presentation to be visually illustrated and reinforced. The subsequent increase in audience participation and attention resulting from the use of a micro facilitates the learning process. Albeit, the effectiveness of an extension seminar or event is difficult to measure and we have to revert to subjective and reflective benchmarks such as audience evaluation, follow-up contacts, etc. Additionally it allows the speaker to quickly modify information in response to audience questions and concerns. This function is analogous to that of an electronic blackboard. As an electronic blackboard, the micro-computer greatly increases the credibility of a presentation, thus helping the specialist to create and capitalize on a "teachable moment." The effective use of a micro at these sessions requires either a E.D.P. 56 projector or several monitors.

Another benefit of a micro is that a specialist can quickly prepare and update material for extension presentations. Many presentations, especially marketing presentations, are improved with use of current or daily information. A computer allows one to quickly and easily

incorporate recent information into examples and graphs. This can be done equally as well by either a mainframe or a micro, but the advantage of the micro is in reduced processing costs.

2. Livestock nutrition seminars. The initial extension use of the micro-computer in the Calgary region was at seven cow-calf seminars and four dairy nutrition seminars. These sessions were organized by the Regional Livestock Supervisor or the Dairy Specialist in co-operation with a District Agriculturist or a Veterinarian. The micro was set up at town halls, veterinarian offices, and Alberta Agriculture District Offices around the region. Some of the meetings were held as group workshops while others were held as a one-on-one advisory session.

At these meetings the micro was used to analyze rations using actual feed test results, and to calculate the cost of alternative rations. The speed and efficiency of the micro allowed additional time for discussion on production and herd health considerations, financial implications of alternative plans such as selling versus feeding calves, marketing plans, etc The stand alone independent data processing that the micro provided has proven to be a real asset at these sessions. At similar sessions where a portable terminal was used to access a mainframe computer, we encountered numerous problems. Slow and laborious input-output and editing routines, as well as telephone transmission problems, resulted in most of the time being spent trying to process data, with little time left for any discussion. Perhaps with time, mainframes could be altered to be equally efficient, but would they be cost efficient?

3. Fertilizer, poultry, dairy, marketing, and tax planning seminars. The micro has been used to prepare and deliver information at three fertilizer planning seminars, one dairy seminar, two tax planning sessions, two marketing events, and to prepare information for one poultry seminar, and several marketing presentations. At these sessions various programs were used to illustrate:

- the marginal cost, marginal return relationship for feed and fertilizer, as well as the influence of price and interest rates on the above MC-MR relationships,

- the value of higher quality alfalfa to dairy herds with optional production levels (substitution or input-output relationships),

- the dollar value of alternative feeds,

- the cash flow advantages of various tax and estate planning strategies, and

- stock use ratios as well as the effect of recent supply and demand changes.

In these sessions, the micro helped to stimulate audience interest and participation. For the future, the micro will be used at more of these events and included in the multi-day accounting and financial management courses planned for this fall.

For those sessions where the micro was not included in the presentation it was often used as a resource to calculate new examples with current data, and helped improve the quality of these presentations.

4. On-site consensus research data, collection and processing. A major use of the micro-computer is in the on-site collection and processing of production economics information. In Alberta, the CRD program is a valuable method of providing timely production economics information In this, as in other programs, the elapsed time between when the data is collected and the time when it is available for use can be a problem. While a computer has always been used to process this data, the on-site use of a micro has greatly speeded up the CRD process. A visi-calc type program provides us with the capacity to collect, process and evaluate data in the same time that it previously took to collect data onto a paper input sheet. At these sessions, we are now spending considerably more time discussing and calculating the financial effects of alternative management practices such as calving percentages, weaning weights, and alternative fertilizer levels as well as the effect of other changes such as interest rates and increasing input costs. The micro provides timely information that has a great deal of credibility. The interest stimulated at these sessions often keeps us an additional two to three hours calculating and discussing "what if" questions. Again this technology is helping us to create and capitalize on a "teachable moment."

In the future, all of our data collection programs could benefit from portable terminals--it's as easy and fast to input on a micro at a kitchen table as it is to fill out a paper input sheet. The farmer can immediately see the output. Editing and some of the validation then takes place during the initial session. Economic studies of fluid milk, swine, and poultry industries benefit from this technology.

5. Other applied research studies. Given the availability of a micro-computer, extension staff can use it in a wide variety of applied research projects. Perhaps this could be handled as easily on a mainframe but the micro has some advantages. These advantages include:

- convenience: you can use it on your desk, at a work area or at a residence,

- availability: it's ready to work when you are, 12:00 p.m. or 7:00 a.m. (unlike some mainframe systems),

- ease of use: the computer is friendly and easy to program; many financial calculations can be handled with simple arithmetic calculations on visi-calc or on pre-programmed statistical packages,

- cost effective: after the initial investment in hardware, software, and a few discs, there are no additional charges for processing or storage time.

Because of the above charactertistics, the micro has been used to calculate bull and ram test data, sheep and beef ROP, exotic animal rations for the Calgary Zoo, supply and disposition data for Alberta barley, and the effect of exchange rates on crushing margins. In the next year the micro will be used to process data from the Alberta Farm Demonstration and Applied Research Projects.

6. Client advisement. Another area that has a great deal of extension potential is that of client advisement but to date we have only had limited experience in this area.

One successful application was in assisting a Strathmore farmer with the analysis of on-farm zero-till information. This farmer has kept careful records of all his inputs, related expenses and yields for three years on six fields. The fields have been divided: one side, continuous conventional-tillage and the other side, continuous zero-till. The result is a considerable amount of data for analysis In previous years this data was analyzed with a mainframe, but this year it was carried out much more efficiently with the micro; here again the micro allowed one to edit data at the kitchen table and to discuss and illustrate possible alternatives. Every year one or two farmers request this type of analysis and the micro has the capacity to streamline and enhance the extension benefits from these analysis.

An additional responsibility of extension economists is to assist farmers in preparing loan applications, project proposals, and to advise clients with debt restructuring. The micro has been used in several of these types of projects in the Red Deer Region. One concern with this is that the micro may complicate and bewilder a client rather than help him learn financial concepts. There may be a trade-off here between providing fast service and extension, as education requires more time than service.

7. Professional update and communication. The final category of potential extension use for micro-computers is in the area of updating professional staff: possibilities exist for access to data banks and as a communication link between specialists. Data can be loaded down from a mainframe system directly to a micro and then analyzed, or conversely, a file can be prepared on a micro and loaded to a mainframe for public access, analysis or printing.

Thus far, our efforts in this area have met with limited success owing to a lack of expertise. But, the potential exists, and with the

help of a good system analyst, this problem will be worked out. For the while, we either use the mainframe or print out data from a mainframe and then re-input it on our micro programs.

Advantages and Disadvantages of Micro-Computers

As with any new technology there are both advantages and disadvantages associated with its use. In the following I will review those characteristics that I have become aware of over the last several years.

Disadvantages

1. A micro system is expensive: The equipment we are using is worth approximately $8,000 with software. For a complete top line system one could spend up to $17,000 for hardware and software, including color graphics, printer, 256K memory, and hard disc storage. An E.D.P. 56 monitor/projector is worth an additional $8,000.

2. Rapid technological changes: Every month new developments are available with more memory, more storage, better operating systems, and better monitors. Equipment is quickly dated and new equipment can handle many jobs you may want to do. Along with these developments is the problem of standards or lack of standards. Much of the equipment is not compatible with other equipment.

3. Software: While a great deal of agriculture software is being developed, much of it is not well documented or easily transferred between systems. While this is a problem now, I feel standards will develop and more programs will become available. AgNet is planning to become a clearing center/distribution facility for micro programs.

4. A second concern is the development of sophisticated programs: you are on your own hook, or you have to acquire the services of a competent analyst/programmer.

5. Individual responsibility for system: If you have a problem, you often have to solve it yourself. Adequate resources are difficult to find.

Advantages

1. Inexpensive to operate: After the initial investment in equipment and software, there are no additional costs for use. A lot of simple repetitive calculations that do not warrant mainframe use are economically practical on a micro.

2. Convenience and portability: The machine can provide data processing anywhere that you have a dependable power supply: on a kitchen table, in an office, or at a remote community hall.

3. Independence: A micro can be used in remote locations without the problems associated with data transmissions over telephone lines, or other problems that may occur with the mainframe system.

4. Availability: The micro is available when you want to use it. It is not affected by prior use, someone else crashing the system, or by someone else's timetable.

5. Ease of use: Micro programs tend to be oriented to a layman user and are therefore usually very simple to use.

6. Availability of financial and statistical software: Many economic and financial programs can be developed using visi-calc programs. The programs I use, took approximately three working days to write not because I can program, but because I have learned how to add and subtract. Previously, some modifications made to the same programs at the University of Lethbridge took a competent programmer two weeks. Also with the large number of users, more software is being developed daily, and some of it will be easily transferable to various systems.

7. Rapidly expanding technology: Additional memory storage is adding new benefits and potential every day.

8. You can develop and modify programs at will, to suit specific needs.

Summary and Conclusions

The micro offers an inexpensive and practical tool to help extension economists in their programs, and to deal with the time lag that plagues the collection and dissemination of extension materials. The micro also helps to create and capitalize on "teachable moments" in extension presentations, and to provide clients with better information sooner. The use of this equipment will expand rapidly in the next few years as new users apply this tool in their programs. New programs will be developed to solve production and management problems, and to run farm management simulations. Modular learning programs will be developed to replace correspondence courses. A farmer will be able to rent a micro from an education institution as a part of his tuition fee.

Given the rapid expansion in the on-farm and extension uses of the micro, it is a challenge for all of us to work toward developing the benefits that this technology can provide farmers through the extension process.

AN EVALUATION OF MICRO-COMPUTERS USE IN EXTENSION PROGRAMS--THE ALBERTA EXPERIENCE

J. Wilson Loree*

Alberta Agriculture's experience with micro-computers in extension began in the winter of 1978-79 with the purchase of our first 8K Commodore PET machine to work on the development of risk analysis budgets. It's uses expanded into ration balancing and machine costing as well as computer education for farmers and staff. In 1980 two additional Commodore PETS with 32K capacity and disk drives were added. With the larger capacity available, more complete programs were developed which included diet and dollar detective programs, with the assistance of Home Economics staff. We also developed VISICALC uses. Several tax planning models were developed on VISICALC, one of which assisted the optimization of after tax family income by paying salaries to spouse and children. As well a program to calculate how much an individual could afford to pay for prospective land purchases was developed. It found particular application in supporting courses for rural real estate agents.

Another major activity for our micro-computers was the demonstration of and teaching about computers to support development of computer literacy by farmers and staff. The machines travelled to a wide variety of locations where they were used by staff in demonstration booths at fairs and office open house days etc. Our machine in Olds has also been used as a base for providing information in our monthly Compufarm newsletter which has now developed to over 1,000 subscribers.

In the summer of 1981, our micro-computer project developed. It is a subset of our departments overall long-term computer plan, called "Alberta Agriculture Programmed Access to Communication" (AAPAC). In this micro-computer project, 13 additional machines of a variety of brands were acquired. They included Radio Shack Model II's and III's, Apple II and III and Commodore PET 4032's. An Electrohome EDP-56 large screen projector was also purchased. The micro-computer project was basically a pilot training project for Alberta Agriculture staff to provide information which could assist in making future decisions regarding equipment acquisition and use. The project was designed with three phases in mind, mainly: software development, computer awareness, and staff training. The software development phase began in July 1981 and operated until April 1982.

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The objectives of the software development phase were:

1. To generate several agricultural computer programs to use as a training base. These were to be predominantly of the decision model type.

2. To produce quality user instructions to accompany each program.

3. To determine time and training requirements for inexperienced staff to develop programming skills.

4. To determine requirements for development of useful software.

5. To determine ease of conversion of software from one microcomputer to another.

Two key items have facilitated the development of programs for the project They are the development of programming and documentation standards and the development of standard subroutines for each type of machine. While standards have been talked about before, as a part of this project, Alberta Agriculture's staff developed a set of standards. These should be available in October in a finalized bound format. Utilizing these standards, a library of programs was developed to be used in the awareness and training phase of the project. This library included 13 BASIC programs and 14 VISICALC programs with full sets of user instructions. The attached Table 1 provides a list of these programs and the equipment they are available on at this time. Most of the programs are available free of charge to individuals if they are willing to abide by Alberta Agriculture's program release guidelines. Basically, these guidelines require that program recipients will not sell the programs and that they recognize the use of the program is their own responsibility.

The programs developed by staff in the software development phase are now being used in the combined awareness and training phase of the project. Objectives in this phase are to provide information on:

1. The effectiveness of software developed to date.

2. The ease of installation of equipment at the district office level.

3. The usefulness of a computer in supporting district office activities.

The awareness and training phase of the project is underway in Region V, one of Alberta Agriculture's six administrative regions. The project will last for three months in this Barrhead region with three different groups of staff each having access to the equipment for one month at a time. The third group will be completed at the end of July 1982.

Table 1

Alberta Agriculture Programs - July 8, 1982

BASIC PROGRAMS	BRANDS/MODELS					
	APPLE II	APPLE III	PET	TRS-80 MOD II	TRS-80 MOD III	IBM (P.C.)
STANDARD SUBROUTINES	Y	Y	Y	Y	Y	Y
BESTCROP (crop comparison budgets)	Y	Y	Y	Y	N	Y
BFP (Breakeven beef feeder prices)	Y	Y	Y	Y	N	Y
CARCOST (Car and truck cost calculations)	Y	Y	Y	Y	N	Y
CFP (Comparative feed prices)	Y	Y	Y	Y	N	Y
CRCROP (Costs & returns for crop enterprises)	Y	Y	Y	Y	N	N
DIET (Human nutrition calculation)	Y	Y	Y	Y	N	N
DOLLAR (Compares family spending with averages)	Y	Y	Y	Y	N	N
HAYCRAB (Probability analysis of hay selling)	Y	Y	Y	Y	N	Y
LANDPURCHASE (calculates the value of land)	Y	Y	Y	Y	N	Y
LOAN (Canadian loan amortization)	Y	Y	Y	Y	N	Y
LOAN2 (Can calculate one of interest rate, term principal, payment)	Y	Y	Y	Y	N	Y
RATION (Ration balancing)	Y	Y	Y	Y	N	Y

VISICALC WORKSHEETS	APPLE II	PET	TRS-80 MOD II	IBM
CALFBUD.VC (CALF Sell/purchase BUDget)	Y	Y	Y	Y
CRD-COW-CALF.VC (Costs & Returns calculations for cow-calf enterprises)	Y	Y	Y	Y
CRD-CROP.VC (Costs & Returns calculations for crop enterprises)	Y	Y	Y	Y
FARMSELL/81.VC (Tax impact of selling a farm under 1981 tax conditions)	Y	Y	Y	Y
GENAV/81.VC (GENeral AVeraging calculations under 1981 tax conditions)	Y	Y	Y	Y
HOG CASHFLOW.VC (CASHFLOW worksheet for a hog operation)	Y	N	Y	Y
INCOMESPLIT/81.VC (calculates the 1981 tax impact of splitting farm income, from families of 4 or 7 children)	Y	Y	Y	Y
ITC/CCA/81.VC (calculates ITC or CCA under 1981 tax conditions)	Y	Y	Y	Y
MACHINERY CST.VC (calculates per hour & per year total cost of operating machines)	Y	Y	Y	Y
PASTURE RENT.VC (calculates the cost and returns split in a pasture rental agreement)	Y	Y	Y	Y
REPL.PROP/81.VC (REPLacement PROPerty - selling out and buying another farm)	Y	Y	Y	Y
TAX-SUMM/81.VC (Year end TAX planning SUMMary for 1981)	Y	Y	Y	Y

All of the programs are fully documented and include some direction in modification for future tax years (assuming that the basic structure has not changed). We hope to update the relevant tax programs when we get the time to reprogram and have a better idea of the final rules. I pity anyone who has to produce these kinds of programs on a commerical basis and provide any sort of continuing support.

Information Available From: Farm Business Management Branch
Box 2000, Olds, Alberta, TOM 1P0
Phone: (403) 556-8421

The equipment and programs were introduced to staff at two-day sessions followed by the return of the equipment to the home office. The staff were then encouraged to work with the programs available and to use them with clients.

What Have We Learned?

I posed this question to the project leaders in preparation for this paper. Their answers are preliminary opinions and not the complete or full analyses of the project information. Since the final phase is not complete as yet, the information here must be considered as preliminary reactions. A final report will be prepared in the fall of 1982.

Based on preliminary information, we have identified these significant items:

1. Standardization of documentation and program subroutines is necessary with the numerous programmers and users involved. This standardization has contributed to better programs with fewer mistakes.

2. It's not as easy as it seems to learn to program effectively. Learning of programming skills and development of decision models requires significant time commitments on the part of novice staff programmers. Early estimates suggest upwards of 100 hours are required to develop a decision model complete with backup documentation.

3. The variety of machines has increased the program development and learning time involved. The standard subroutines reduced problems in converting programs between machines. However a variety of printer combinations and the equipment variety created extra work in development and updating the programs as well as maintaining backup copies of disks.

4. The large screen projector (Electrohome EDP-56) is needed for group work. This allows projection of the video monitor contents onto a screen comparable in size to an overhead projector or slide projector.

5. The hardware has been less reliable than expected.

   a) All our Centronics 737 and 730 printers have broken down at least once, although they were subsequently repaired.
   b) Our Radio Shack III's had some system troubles.
   c) Our Apple II's have had disk drive difficulties as well as memory and display chip failures.
   d) The Apple III has encountered over-heating difficulties resulting in chips working loose.
   e) Commodore disk drives have gone out of alignment resulting in incompatibility between the various Commodore machines and disk read errors.

f) No troubles have been encountered with our Radio Shack model II's, Radio Shack Line Printer VI or Commodore printers (Epson).
g) The equipment has not proven to be as easily portable as initially expected. This can be understood as the requirements for a novice to pack several components to remote meeting sites and then get all the cables plugged into the right places can create difficulties.
h) The BASIC language has been constraining or restrictive on the PET's and APPLE machines. The RADIO SHACK has the best/most complete BASIC but it's program development is limited by it's more awkward line editor compared to screen editors on the other machines.

6. An ideal machine should include:

a) Capability to dump screen contents to printer with minimal instructions.
b) 80 column screens.
c) 132 column printers.
d) 64K of random access memory (standard subroutines utilized more space).
e) Composite video output for utilizing video monitors e.g., EDP-56.
f) Microsoft BASIC 5.0 plus full screen editor plus VISICALC with at least 25K of memory.

7. VISICALC has been an effective straightforward program for novices to develop material on However it requires a higher level of user competence than the BASIC programs we have developed. VISICALC has been useful for worksheet work or the "quick and dirty" analytical work done in preparation for a variety of presentations. However it lacks idiot proofing, controlled input ranges and protected fields, etc. Perhaps newer versions or other spread sheet programs, e.g., SUPERCALC would overcome some of these limitations.

8. Preliminary reaction to the training and awareness phase is available as the three introduction courses have been held by this time. It appears that staff acceptance and use is attitude dependent. This should be of no surprise to extensionists who are aware of the adoption process and the adoption process which is apparent with the introduction of new technology. The hands-on training worked more effectively with two participants per machine. They were self-supporting of each other, one remembering the steps to follow if the other was unsure. When a third person was included in a machine grouping, inevitably one individual was left out of the learning process.

9. The variety of machines on hand increased support staff needs, as it was not possible to direct the whole group to press a certain key to achieve a specific result. Different keys give different results on various machines. A maximum of 20 students should be considered for training sessions.

10. Some staff have been surprised how easy it is to learn to use the programs. While some have used the programs successfully with clients, others have been embarrassed as they did not have complete knowledge of a program prior to the client demonstration with a client.

Wrap Up Comments

> More complete analysis of this not yet completed training and awareness phase will be available following its completion. The results of this micro computer project will direct Alberta Agriculture's use and abuse of micro computers and yes even mainframes in the next few years. We will have learned a lot from this project.

In my opinion, we are seeing only the first stage of use of this technology as we move into the future. It is my belief that the technology will grow to be more effective in its use as a tool of management--perhaps even a vehicle on which to build farm management literacy.

COMPUTERS AS AN AID TO LEARNING

L. Bauer*

Introduction

The topic orginally assigned to me was, "The Use of Micro-Computers as an Instructional Tool." This seemed to be a challenging topic at the time. However, when I started to collect my thoughts for the presentation it became apparent that "Computers as an Aid to Learning" might, for a number of reasons, be a more appropriate title. Although micro-computers are an important fact of life in education it may be more useful to talk about computers generally without the restrictive "micro" prefix. Secondly, the word instruction implies a teacher dispensing knowledge to the student and this may divert attention away from the more fundamental purpose of education which is "the acquisition of knowledge" by the student. Above all else education should instil, in the student, a thirst for knowledge and a joy of learning. The vision of a teacher dispensing knowledge is not necessarily consistent with the student's acquisition of knowledge.

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The view expressed by Owen[1] is to consider the instructor as a facilitator of the learning process. This viewpoint is a more useful one, especially when one is talking about the learning processes of adults where their previous experiences play such a vital role. Boelje and Eidman[2] perceive four objectives as paramount in university and adult education. These are:

1. transfer of facts,
2. increase of analytical capabilities,
3. capability to integrate facts, values and analytical concepts, and
4. clarification of values.

Computer Assisted Instruction

Computer technology properly harnessed can and is playing an important role in facilitating the learning process. In fact, computers have been an important facility in universities for more than 20 years although they are best known in that environment as instruments of data analysis in research. Their direct use in teaching has become popular more recently although computer technology in education itself has been around for some time As an example, a joint effort between Control Data Corporation and the University of Illinois developed a system called "Programmed Logic for Automated Teaching Operations" back in 1959. This system, abbreviated PLATO, is being used at many locations including the University of Alberta. The promotional literature[3] points out seven modes of computer assisted instruction present in PLATO. These are quoted here because they provide a list of useful computer applications to the learning process.

1. Drill-and-Practice provides the student with a wide variety of exercises that help him memorize facts, comprehend concepts, or master skills. The lesson can rapidly generate, from a data base, drill-and-practice exercises that are tailor-made for each student.

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[1] Lorne J. Owen, "Farm Management Development Training Guidelines for Alberta Farmers," Unpublished M.Ag. paper, University of Alberta, 1981.

[2] Michael D. Boelje and Vernon R. Eidman, "Simulation and Gaming Models: Application in Teaching and Extension Programs," Amer. J. Agr. Econ., 60(1978):987-92.

[3] Control Data Corporation publication, Corporate Headquarters, P.O. Box 0, Minneapolis, Minnesota 55440.

2. In tutorial mode the computer presents material to the student and then checks for comprehension by requiring feedback (to a question, a problem, a situation) from the student. Depending on the student response, the program next presents new material or re-presents material that the student missed, usually in a different manner from the first presentation.

3. In the inquiry mode the lesson contains data that is supplied on student demand. When the student asks a question, the lesson provides the answer.

4. The dialogue mode provides complex interaction opportunities such that both the student and computer ask and answer questions of each other. The system ably tracks the student's reasoning patterns and assures that he acquires the information necessary for making accurate decisions.

5. The simulation mode presents the student with a "working model" of real life (as defined by the author). The permits experimentation with alternate solutions, learning through insight after repeated trials, and provides a laboratory-type environment in which errors become catastrophic only symbolically.

6. Computer games place the student/user in a competitive situation with either another person, the computer, or himself. He can then attempt to improve his record of success in an interesting environment.

7. And finally, the computer can be used by the student in the problem-solving mode to provide solutions to a wide variety of problems.

These modes could perhaps be thought of as progressive steps in knowledge acquisition and application. The first four categories (drill-and-practice, tutorial, inquiry and dialogue) might be thought of as a programmed learning approach to conceptual material or, if you like, the transfer of facts and strengthening analytical skills objectives. The next two (simulation and games) are methods of integrating concepts. The last mode (problem solving) is an application of integrated concepts to a problem relevant to the student It is this which moves the student into the real world.

1. Programmed Learning

The vision that comes to mind when one thinks of computer assisted instruction is that of a student sitting in front of a computer terminal or micro-computer completing a series of lessons primarily to learn basic concepts on a variety of topics. The student responds to material presented by the computer and the computer rules on whether the response in correct or not. The computer keeps score and the student is able to progress at his or her speed through the material, going back to review unclear concepts and forward to new ones.

Lessons could be conceived as stand alone in the sense of "a correspondence school approach" where an interested student would select a course and work through it independently of any direct human intervention, either by an instructor or mailman. Another approach would be to use the computer assisted instruction in conjunction with the more traditional classroom or lecture setting. The use of the computer would be to review and develop skills surrounding conceptual material learned in the more conventional way. For example a lecture may be given on the principles of choosing profit maximizing fertilizer levels. The student then works through these same principles on a computer terminal to reinforce his or her understanding of the concept. This might then be extended to work through problems to enhance understanding and provide skill in applying the concepts. This is really mechanizing what we now do in laboratory or problem solving sessions. The computer can prompt the student through areas of weakness thus facilitating learning and it can keep score or provide a grade indicating the level of achievement on the exercise.

Computer Assisted Instruction using PLATO has been applied in a number of different fields including accounting, agronomy economics, medicine, sociology and many others. We are currently reviewing two PLATO modules on capital budgeting as to their suitability in our financial management course.

Murphy and Appel,[4] in a study of courses in Business, Science, English and Mathematics at U.S. community colleges, established that there was no appreciable difference in student performance by PLATO versus the more conventional methods. This was confirmed by Pratt and Davis[5] who could detect no measurable difference among students learning macro economics in a conventional environment, a computer assisted environment or in a combined environment. If the quality of education is the same, i.e., students learn equally well, as economists we should recognize this as being on an iso-quant, hence able to make trade-offs between labour, on the part of the teacher, and capital, in the form of computers. In other words one is in the position to use the least expensive method and this likely involves extending the accomplishment of instructors through the use of computers.

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[4]Richard T. Murphy and Lola Rhea Appel. "Evaluation of the PLATO IV Computer-Based Education in the Community College," Association for Computing Machinery, Special Interest Group on Computer Use in Education (SIGCUE) Vol. 12, No. 1, Jan. 1978.

[5]Leila J. Pratt and Lloyd D. Davis, "The Use of Computer Aided Instruction in the Teaching of Macro-Economic Principles," Association for Computing Machinery, Special Interest Group on Computer Use in Education (SIGCUE) Vol. 15, No. 1, Jan. 1981.

The benefits of computer-assisted learning are substantial; however, these do not come without cost. Effective lesson preparation has always taken time and one should not expect this to be different for computer lesson material. In fact, the promotional literature of PLATO state that it takes 100 hours of preparation time for a lesson that a student learns in one hour. Modules, like the capital budgeting material are available on a rental basis at a cost of $4.50 per student hour. These modules are estimated to take about seven hours to complete.

Advances in micro-computers and in telecommunications, e.g., Telidon, present opportunities for increasing our educational capacity, thus enabling upgrading agrologists in their farm management knowledge. Although I have discussed programmed learning in the context of PLATO which is a mainframe based system, there is no need to restrict computer assisted instruction to this mode of operation. In fact, the coming popularity of micro-computers should be recognized as an important opportunity for continuing education.

In the profession of farm management we have numerous bulletins, pamphlets and lesson modules intended for training farm management councillors and farm managers themselves. In 1974 the Canada Farm Management Committee initiated a project to identify the training needs of farm management workers and set out to develop course materials to fulfill these needs.[6] This project has developed a list of areas in which farm management councillors should be competent along with training modules which, if completed by a farm management councillor in training, would serve to upgrade the required skills. This framework could serve as a basis for developing computer-assisted instruction for the farm management profession.

2. Games and Simulations

An important step in the learning process is the step of "putting the conceptual pieces together" into a functioning system. Simulators have been used in numerous situations. The best way for a student to learn management skills is, after some basic concepts have been mastered, to actually go through the practical process of managing a business. Computers are being used to advantage in letting the student operate a business in a laboratory simulated situation. Obviously the real world would be too costly and too slow for getting all of the practical

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[6] "A Guide to the Purpose and Use of the Canadian Farm Business Management Modules," Agriculture Canada, no date.

exposure needed. Instead of having each student in a class of 50 put in charge of a farm business and then having him manage it we simulate the business on the computer, ask the student to analyze situations, make decisions and carry on other managerial functions. The simulated results provide him with indicators of how successful or unsuccessful his management has been.

Simulations for learning purposes are frequently carried out in a "game" atmosphere where the student is competing against other students, against mother nature or the market place. It is our experience that students react very favourably to the learning environment provided by games and simulations. The instructor must of course remain on top of things so that the simulation does not become just a game at the expense of the principles and lessons to be learned. We use a number of simulations or games in our courses.

The futures game[7] is used by students to learn the practical side of commodity markets. The student is given a sum of (artificial) money and uses this on the futures market. Price changes are exactly as they happen in the market place and so the student has real world exposure to live information for decisions of buying and selling.

We use a small business game[8] in the agri-business management course. Substantial revision has been made to the original version. In this game students are in competition with one another competing for market shares etc. The rivalry can become very intense, but within this framework students learn the meaning of balance sheets, profit and loss statements and learn the techniques of sales management and merchandizing.

A third simulation, which we use in our Farm Management courses is the Alberta Farm Business Simulation (ALTASIM).[9] In this simulation students, working as individuals or as teams, are given an endowment of land, machinery, buildings, cash and liabilities and an opportunity to raise seven different crops, a beef cow-calf enterprise and a beef feeder operation. The student assumes the role of operator/manager with the objective of accumulating as much equity as possible after a specified number of years, usually three. Rules are introduced and changed as time progresses. The student is able to integrate various economic and business

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[7] The University of Alberta version is an adaptation of one developed earlier at Cornell University.

[8] "The Small Business Executive Decision Simulation: Operating Manual," Bureau of Business Research, The University of Texas, 1967.

[9] "ALTASIM, The Alberta Farm Business Simulator Users Manual" Joint, Alberta, Agriculture and the University of Alberta, no date.

skills. For example, micro-economic concepts are brought in first, when the student must decide on what crops to grow, and how much fertilizer to use. Then we introduce price and yield uncertainties, allow the purchase or rental of land, the sale of land and the trading of machinery. In the third year we allow the introduction of livestock. Operating capital is rationed to teach financial management and the realities of cash flow difficulties.

ALTASIM has been used not only with students at the university. The community colleges have also been making use of it and Alberta Agriculture has used it in extension and in-service training settings. We used it at a refresher course for Farm Credit Corporation credit advisors, and this past winter at the Western Stock Growers cattlemen short course. The stock growers found it to be a particularly useful learning tool. In their case the objective of the game was to accumulate the largest net worth with the winner recovering the $350 course tuition fee. Cattle prices being what they were the cowboys and cowgirls put in long hours each day in making their decisions. Their reactions were positive and they felt that they had learned a lot about budgeting, cash flow projections and group decision making. It cannot be overstressed that the course objectives be clearly set down by the instructor and adhered to, otherwise the game may become just a game and the concepts to be taught swept away by the enthusiasm of competition for the top position.

3. Problem Solving

A third step in the learning process, and perhaps the one that offers the real test, is having a student able to apply knowledge to a wide range of practical situations. Farm management specialists should be able to apply an integrated set of management principles to the relevant problems or opportunities that have been identified as part of the management process. In other words they must know which tool or technique to apply to a particular situation. In our education programs we must guard against turning out tool specialists. If students learn only how to hold the tools, and frequently we make them highly proficient in that regard, then they are likely to use that particular tool for whatever problem comes along. And, if none comes along they might even go out and analyze a situation so that the tool will fit. This is like turning out a surgeon who is good with a scalpel but who has not learned when and where to cut. The computer is just a tool, but a very versatile one. The crescent wrench is adaptable to fit many different sizes and designs of nuts and bolts. It can even substitute for a hammer. But for it to be useful, the mechanic must know how to make it fit and more important still, he must know what it is that is wrong and needs fixing. The computer, used in the right context, is as adaptable a tool to the student and to the manager as is the crescent wrench to the mechanic.

The Learning Facilities

Although only some departments in the Faculty of Agriculture and Forestry at the University of Alberta require graduates to have a course in computers we are currently in the process of setting up a computer laboratory for use by our undergraduate students. There is interest from all departments although motivation for support varies from department to department. The main reasons behind establishing the laboratory are:

1. Many of our graduates do not have adequate facilities or courses to make use of computer technology. When they graduate and enter the field of extension or other forms of farm contact they find that the farmer may be making use of a technology that they know nothing about. If they choose farming as a career they are lacking in understanding of an important new technology. This is equally true if they find employment in agri-business.

2. Computer facilities on campus are overcrowded and a laboratory would provide access by agriculture and forestry students without them having to compete with the general body of students.

3. Much of the course content. in agricultural business and other agricultural disciplines lends itself to computer application now. Access to the computer coupled with knowledge of how to use it speeds up the learning process and expands the knowledge content as far as the student is concerned.

We have received initial funding of about $22,000 and our plans are to phase into the computer laboratory over a three year period. This facility would ultimately consist of 18 work stations. Each work station will have a micro-computer equipped with a disk drive and access to a printer. In addition the micro-computer will serve as a terminal to the university's main computer. The estimated cost per work station of the facility in 1982 dollars is about $6,700 for hardware. furniture and telephone hookup, plus about $1,600 as annual operating costs including maintenance, telephone rental and supervision. The facility would have priority in scheduled laboratory periods for classes but there would also be free time doing assignments that take more than the scheduled time, and for research. Some monitoring will need to be done so that word processing, writing term papers and playing "Star Wars" does not detract from the intended uses for teaching and research, and so that it does not become an over-flow area for other faculties on campus.

Conclusions

What does all of this mean about the use of computers in the educational framework of an agricultural student? I think it means a number of things.

First of all graduates are going to find computers commonplace no matter what kind of career path they choose--extension, research, teaching or business including farming. Micro-computers are already popular among a certain class of farmers. This means university agricultural graduates will need to know the basics of how to physically use a computer, including especially micro-computer hardware and agricultural and business oriented software. Twenty five years ago hand held calculators were unheard of. Today they are used by virtually everyone. In fact we can hardly get along without them. It will not be long before computers will be as second nature to the masses as calculators are today.

Secondly, it means that graduates will need to learn how to make computers do relevant things. In farm management it means using the computer to do partial budgets, cash flow projections, ratio analysis. There is a popular notion that we can just turn on the computer and have the answer flashed on the screen or printed out on paper. On the contrary, we need more than ever before to have the manager, and his advisor thoroughly understanding the concept upon which the answer is based.

Finally, it means that graduates will need to learn how to reason through problems systematically. Although systematic thinking is an important skill to have acquired even if there were no computers the use of computers to solve real world problems demands such a skill. The computer itself can be used to assist students in developing this skill.

With this reference to computers and systems it may be prudent to close with the observation made by Gwyn.[10] in his analysis of our current Canadian Prime Minister.

> To be systematic is sensible. To be systematic without common sense, without humour, is to treat systems as more important than people

After all, management and economics must be human.

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[10]Richard Gwyn, "The Northern Magus" Paper Jacks Ltd. Canada, p. 107, 1981.